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BY THOMAS WAILGUM



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change + hp

A bright idea in storage.

Advance, a leader in lighting electronics, watched its data storage costs grow along with its business. Advance turned to HP to reverse the trend. With HP StorageWorks, Advance is now able to consolidate its data, keeping critical information online for instant access while constantly moving older data to more cost-effective storage devices. All this has reduced the time needed to manage the storage network from days to minutes and clearly illuminated the path to change. hp.com/go/storageconsolidation

Tools of change: HP StorageWorks SAN, Disk Array, Tape Library





The Next Wave Is Here

Fundamental shifts in technology will make it possible for businesses to realize IT's promise of technology-enabled innovation, responsiveness and speed

Business leaders' expectations of IT are growing. Back in 2002 and 2003, CIOs were primarily expected to control and cut costs—in their own shops and, through IT, in the rest of the company. In 2004 CEOs at a few leading-edge companies began asking their CIOs to help grow the top line through new IT-driven business innovations. Now, in a 2005 IDC survey of CEOs and line-of-business managers, a full 40 percent felt they needed to be more aggressive in their deployment of IT.

CEOs expect IT to be much more dynamic than it's been in the past so that the business can make faster operational changes. The next-generation enterprise is being built on a fluid and flexible service-oriented architecture (SOA), with a mixed insourced/out-sourced, onshore/offshore staffing model.

It's employing new technologies to enable speed and agility with greater degrees of intelligence and automation. This new technology environment is still evolving, and there are many questions yet to be answered: What's the best governance model? How will standards be developed?

What are the security issues? What will licensing models look like? And where will the staff (and the CIOs) with the necessary skills come from?

SOA puts technology into business terms so businesspeople can develop, reuse and change services themselves. It enables quicker rollouts at lower cost, providing faster time to market for new products and services, and thus creates competitive advantage. While few companies have completed the transition to a full SOA environment, there's tremendous momentum in that direction. According to Gartner, by 2008, 80 percent of software development projects will be based on SOA.

But SOA will mean dramatic change for most CIOs and their departments. SOA empowers businesspeople to develop their own services, but it still requires CIO leadership to manage that process. It both enables and demands alignment. And it requires a different set of skills within IT: object-oriented development, business analysis and complex service orchestration skills among them. CIOs had better be hiring and/or building those skills now if they want to meet their bosses' expectations.

CIO will be covering this transition in print, online, at our events and, in our next issue, through a new collaboration with our sister publication, *Computerworld*. You'll find our existing collection of knowledge on SOA at www.cio.com/soa.

Are you ready for the next wave?

A handwritten signature in black ink that reads "Abbie Lundberg". The signature is fluid and cursive, with a long, sweeping underline.

Abbie Lundberg, Editor in Chief
lundberg@cio.com

P.S. For a number of years now, some of our busy readers have been asking us to provide audio versions of our articles. As one CIO put it, "You need to find a way to insert yourself into the spare moments in my day." So a few months ago, we started "CIO to Go"—downloadable MP3 versions of our features and some of our columns. You'll find these with the articles on our website, as well as at www.cio.com/podcasts. Download a few before your next commute or session on the treadmill, and let me know what you think!

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The Trials of Change

When change comes, as it always does, some adapt, some resist and others freeze—how can CIOs thaw them out?



It's always fascinating to see how companies make decisions to improve their business and the value they deliver to customers. These can be sweeping changes, like Konica Minolta's decision to get out of the camera and film business, Intel moving from a chip-maker with the slogan "Intel Inside" to an integrator with the motto "Leap Ahead," or Nike transforming itself from a sneaker company to an apparel company. Or they can be subtler changes that set the tone for a new way of doing business:

Starbucks selling music; 2005 CIO Enterprise Value Award Grand Winner GM launching OnStar (see "Highway to Value," www.cio.com/021506); Apple releasing video-enabled iPods. These are all bold moves by companies that looked at their current landscape and said it was time either to pull the weeds or expand the horizon.

These are risky and difficult decisions that impact the structure and culture of an organization. And when change comes, people react in one of three ways: One group will immediately hop aboard, another will fight the change with all their might, and the third set will freeze like deer in the headlights. These last are talented, thoughtful people who know the train is leaving but are not sure if they should get on or off. And they may not understand that another train is never going to come down the track.

As business technology leaders, you know how to manage the first two groups. Nurture the leaders. Cut bait on the resisters. But what do you do with the last group? If they stay in no-man's land too long, they could paralyze your organization. How much time do you give them? How do you help them to see the opportunity through the fear, uncertainty and doubt? What leadership and management philosophies do you have to share?

The one constant in today's market is change, and people will continue to either embrace or reject it. I would love to learn how you communicate your company's vision and motivate your team to move forward. Please send me your thoughts so we can continue this dialogue on CIO.com. Because, as the "Monkey Bar Law" goes, you have to let go at some point in order to move forward.

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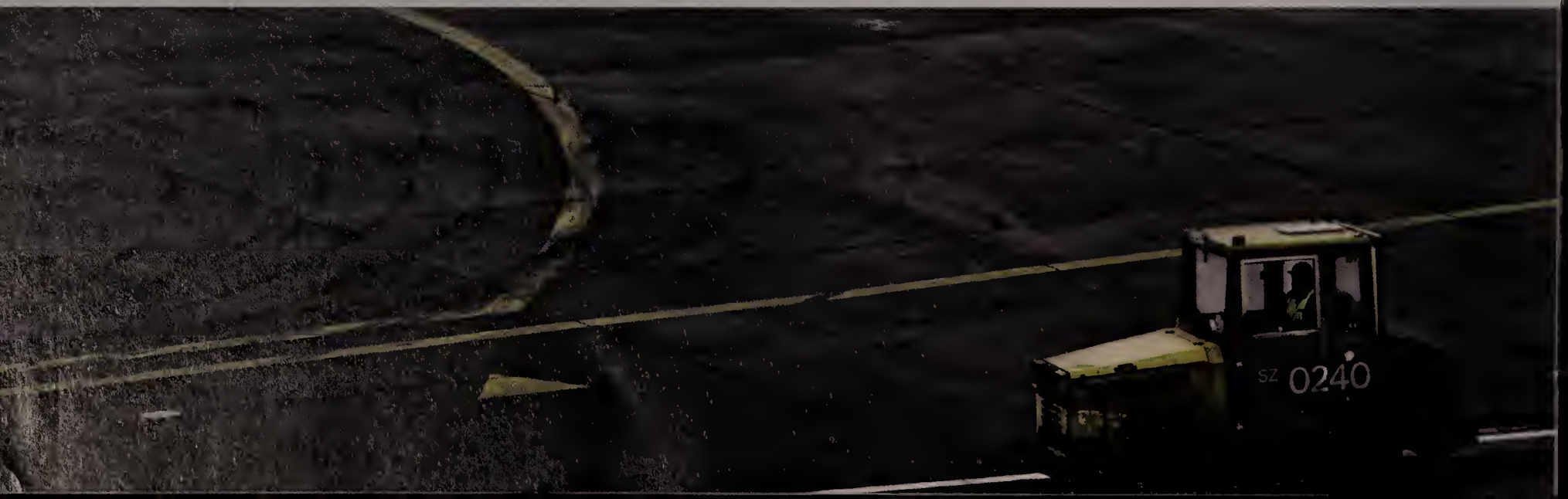
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trendlines

EDITED BY ELANA VARON

NEW * HOT * UNEXPECTED



After Deaths, Mining Industry Digs for IT Fix

After four mining accidents in January and early February killed 16 people in West Virginia, industry experts are studying whether information technology can help to prevent future fatalities. But there's little agreement about which technologies can do the most good.

Investment in mine safety technology has lagged for years, partly because the government hasn't pushed for improvements. Mining regulations instead are focused on training and accident prevention, says Keith Pauley, CEO of the nonprofit Mid-Atlantic Technology, Research & Innovation Center (Matric). "The legislators think that if they prevent an accident, it's better than reacting afterward," he says.

Meanwhile, the mining industry has been "lulled to sleep" by decreasing accident rates, says R. Larry Grayson, a professor of mining engineering at the University of Missouri-Rolla. Since 1990, U.S. mine injuries have

Continued on Page 18

The **CENSORED** Internet

ONLINE MEDIA Microsoft shut down a Chinese blogger recently because he discussed the government's firing of a newspaper editor in Beijing. A few weeks later, Google announced plans to offer Chinese versions of its search and news sites that censor material the Chinese government finds offensive, arguing that censored service is better than nothing.

As the Internet matures into a global medium for both commerce and information, can these uses coexist? Or must companies trample free speech to do

business in China?

The answer isn't clear. Microsoft, Google and Yahoo (which has been accused of providing information to the Chinese government that led to a journalist being jailed) have asked Congress for help. The three companies want the U.S. government to redefine free trade to include the free flow of information. An official government stand against censorship would provide these companies with a negotiating tool when they are asked to censor their sites abroad.

The State Department is investigating the policy aspects of Internet freedom. But Rep. Chris Smith (R-N.J.), who heads a House subcommittee on human rights, says U.S. companies shouldn't help China deprive people of free speech.

Meanwhile, Microsoft is developing a system to block content that a government objects to while keeping it available to the rest of the world. Free speech advocates say this shows Microsoft is aware of its ethical dilemma, but they criticize the company's proposed solution. —Al Sacco



Help for Librarians

DESKTOP COMPUTING With children clonking on keyboards, patrons downloading viruses and kleptomaniacs swiping mice, library computers quickly end up in PC morgues.

"When we started offering Internet access, people would go in and change the settings and reset the computer every day," says Nancy Ferguson, library access services manager at the Richmond Public Library in California. "People just destroyed the computers."

That was before Richmond implemented DiscoverStation, offered by Calgary, Canada-based Useful. DiscoverStation uses one Linux desktop to power up to 10 workstations, leaving only monitors, keyboards, floppy drives and mice subject to public torture.

Since its installation last July, the multiuser solution has allowed Richmond librarians to concentrate on what they do best—helping patrons find information. Prior to installation, a librarian spent up to two hours each morning deleting files people had left on PCs. But DiscoverStation clears personal information and other modifications users have made (including browser history and cookies) with each logout. Another time-saver: Staffers no longer spend time installing firewall protection because DiscoverStation features a built-in security system.

Other features include Internet filtering (to block pornography, gambling and other sites deemed inappropriate for library use) and open-source software compatible with Microsoft Office. But for Kristin Shoemaker, reference and systems librarian at the Malden Public Library in Massachusetts, DiscoverStation's biggest draw is its scheduling capability. The library previously used software that was so buggy that staff often resorted to pencil and paper sign-ins to manage user sessions. "People would cross out other people's names on the grid, or were confused and put their name in the wrong places. Sometimes even fights would break out," she says.

Shoemaker purchased 14 workstations, three years of support, an optional user authentication feature and a printer for under \$22,000. "If we hadn't had the DiscoverStations, more than likely we would have gone without," says Shoemaker. "Gone without adequate antivirus, gone without upgrading at all, and the machines would have gone further and further downhill."

—Lauren Capotosto

Mine Safety

Continued from Page 17

declined by 51 percent and fatalities by almost 67 percent, according to the National Mining Association. "This year, all of a sudden, has turned that all around," Grayson says.

The mining association has asked Grayson, a former coal mine manager, to head an independent commission on mine safety. Part of the commission's work will be to examine which technologies could help. Meanwhile, the West Virginia legislature passed a bill requiring wireless communications inside mines. In the Sago mine explosion in Tallmansville, W.Va., where 12 miners died, fire damaged a wireline communications system, leaving the miners without a way to talk to the surface. Most U.S. mines use some type of wireline system, experts say.

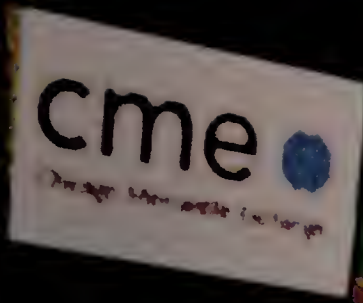
Other technologies have potential to improve mine safety by enabling miners to communicate more reliably with rescuers. But even the best options are far from perfect, says Matt Ward, managing director of Varis Mine Technology. Varis makes communications products such as "leaky feeder" cables, which transmit wireless voice, video and data through a cable that can be strung throughout a mine. The cable "leaks" radio signals, acting much like a surface antenna. But, like telephone wires, the cables can be severed in a mine collapse or damaged by fire.

Another technology, ultra-low frequency text-messaging, would enable communication from outside mines without cables or wires. But it works only one way. Anyone on the surface could transmit messages underground, but workers inside the mines could not send messages in return.

Matric has also proposed that mines use a combination of technologies, including sensors to monitor miners' vital signs and radio frequency identification systems to track vehicles inside mines. Other mining experts suggest using robots to scout out trapped miners, an idea that hasn't caught on partially because of the high cost.

Grayson says the best solution is a mix of overlapping technologies, but deploying several different communications networks can cost hundreds of thousands of dollars per mine.

—Grant Gross



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How to Get a Job as a CIO

What IT executives learned on their way up the ladder

BOOK REVIEW Greg Smith became the CIO of the World Wildlife Fund five years ago at the age of 37. As he climbed the career ladder, he worked as a programmer, a consultant, and a senior IT manager and taught at a local university. In *Straight to the Top: Becoming a World-Class CIO*, Smith describes what he learned along the way.

His purpose is to advise up-and-coming IT executives about the skills they should have in order to land their first CIO position—among them, experience with project management, outstanding communication skills, expertise in managing vendors and a strategy for working with executive recruiters. The book is partly a review of existing literature on best practices in IT management and partly a forum for Smith and other CIOs to communicate their observations about how to succeed. (Full

disclosure: Smith is a member of the CIO Executive Council, a professional community managed by *CIO*'s publisher, and he has written for this magazine.)

Smith is best when he analyzes his personal experiences. In combing that terrain, he delivers an unusual insight: One of the most valuable career experiences an aspiring CIO can have is to work as a consultant. Consultants, he argues, earn their bread by listening closely to their clients. They develop top-notch communication skills, gain experience in multiple aspects of business and assimi-

late best practices for system development. It's good preparation, he thinks, for a job in which success depends on one's ability to establish strong relationships with business users.

Smith also argues that one key to advancing is to network. But it's a challenge for technologists who are typically introverts. Smith explains how he does it. He also prescribes golf as a way to build relationships. (He says it saved his sanity by getting him out of the office.) Even aspiring executives need to have fun once in a while. —Elana Varon

Straight to the Top: Becoming a World-Class CIO

By Gregory S. Smith

John Wiley & Sons, 2006, \$34.95



The Penguin in Africa

OPEN SOURCE Senegal's state IT agency is turning to open-source software to avoid paying what it sees as prohibitively expensive licensing fees for commercial software.

"We are an underdeveloped country without enough funding for expensive software," says Tidiane Seck, director of Senegal's Agence De l'Informatique de l'Etat (ADIE) Dakar.

The move has been under way for a little over a year, beginning soon after the formation of ADIE. The agency is charged with developing an IT infrastructure, including a high-speed network and applications for accounting, payroll and other functions, for Senegal's government ministries. ADIE runs Linux on its approximately 100 file, e-mail and directory servers and uses MySQL AB's open-source database. The agency is also deploying ERP5, an enterprise resource planning package from Nexedi, a French software and services company. The ERP software also runs on Linux servers.

Even some big businesses in Senegal do not have the budget to buy ERP software from vendors such as SAP and Oracle, Seck notes.

Nexedi offered French government agencies free training on its software if, in return, the trainee contributed to the software's development, said Jean-Paul Smets-Solanes, Nexedi's chief executive.

No French agencies responded, but word of the offer reached Senegal where Mayoro Diagne, a developer with ADIE, took the training course and developed a new budgeting module for ERP5. Senegal, in West Africa, is a former French colony.

The Senegalese IT agency has installed Nexedi's payroll, accounting and budgeting modules internally where they are used by about a dozen people, Seck says. "What we are doing now is using ourselves as a kind of pilot, and we intend to push other government agencies to use these systems."

Microsoft had originally sought the ERP contract with the Senegalese agency, according to Diagne. Smets-Solanes said the agency was using a Microsoft Excel application that it had modified internally for its payroll operations.

—James Niccolai

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States Suggest Fix for What Ails DHS

SECURITY The U.S. Department of Homeland Security could do a better job of helping state and local governments protect their IT infrastructures from attackers, according to the National Association of State Chief Information Officers (Nascio).

Specifically, DHS should do more to promote its existing IT security programs, best practices and methodologies, as well as tools for risk assessment, operations continuity planning and training, says Denise Moore, chief information technology officer with the state of Kansas.

The recommendations are based on two separate surveys of state and local IT officials, such as CIOs and CSOs, conducted by Nascio and the Metropolitan Information Exchange, an organization for local government IT executives.



The relationship between DHS and IT officials from state and local governments is "detached," says Moore, who heads Nascio's information security committee. She suggests that DHS's National Cyber Security Division do more outreach. In addition, she says, DHS can do

better to assess state and local cybersecurity needs, which would boost the likelihood of state and local agencies getting funding increases to protect their systems. Moore also says DHS should focus more on supporting state and local CIOs on matters related to criminal or malicious attacks and on problems caused by internal employees' "ineptitude" concerning IT security. —Juan Carlos Pérez

washingtonwatch

EDITED BY ALLAN HOLMES

Patent Reform Too Late For BlackBerry Users

Pharma, IT industries battle over proposed bill

A Texas congressman plans to reignite his effort to reform how intellectual property disputes are conducted, such as the one being duked out by BlackBerry maker Research In Motion



Rep. **Lamar Smith** (R-Texas)

(RIM) and NTP. If the bill sponsored by Rep. Lamar Smith (R-Texas) is enacted, it could protect end users from losing the right to use disputed technologies while a patent infringement case is being adjudicated.

Smith is chairman of the House Judiciary Committee's Subcommittee on Courts, the Internet and Intellectual Property. His bill constitutes the biggest overhaul of the patent system in more than 50 years.

An early version of the bill proposed eliminating injunctions in patent infringement cases, such as the injunction NTP requested against RIM, which, if granted, would halt BlackBerry service in the United States. The threat of an injunction is typically enough of an incentive to convince an alleged infringer to settle with the company that claims it has been damaged. But RIM has refused to do so.

However, large pharmaceutical companies rely on injunctions to stop competitors from copying drugs still under patent protec-

tion. The pharmaceutical lobby helped derail Smith's bill last summer. Recently, however, Smith held meetings with representatives from both the technology and pharmaceutical industries in an attempt to find common

ground. Both groups, for example, are open to changing the current system, which awards patent rights to whoever can prove he invented something, to a system that grants the patent to the first person to register an invention.

Ronald Riley, president of the Professional Inventors Alliance, is against the bill. He says that if Congress eliminates injunctions—often the only legal recourse that small companies and independent inventors have in a patent dispute—then large technology companies will have what amounts to grabbing rights over emerging technologies. He says his group is prepared for a "bloody" fight.

Smith says he is optimistic that he can pass the legislation this year. But patent reform will come too late to help RIM—or BlackBerry users—in the suit with NTP. At press time a judge was considering final arguments for and against NTP's injunction request.

—Ben Worthen

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by the numbers

BY KATHERINE WALSH

Time in Training Often Wasted

Highly paid workers most likely to benefit from learning new skills

ONE IN THREE WORKERS thinks the time he spent in his last training session probably would have been better spent elsewhere, according to a survey by Hudson, a staffing and consulting services company. Among these workers, 12 percent think the training was a complete waste of their time.

Although the poll did not ask the 1,674 respondents what their jobs were, Rose Pagliari, an associate director with Hudson's Learning and Development Group, says the results are relevant to IT workers. "Technology is constantly changing, and for these workers to stay abreast of what's happening in the market, they need to keep their skills up-to-date," she says.

Self-improvement was the main reason for participation in training; 68 percent of respondents said they attended training because they thought it would provide useful, job-related information. Another 28 percent said they were told to go. The remaining 3 percent went to training to meet people or to get out of the office.

Pagliari says that for IT training programs to be worthwhile, they need to combine the teaching of new technology skills with education about softer skills, such as business, communication and negotiation, "giving [workers] the ability to become well-rounded businesspeople."

According to the survey, employees with the highest incomes are the most likely to participate in and benefit from training. However, lower-income employees are the most likely to pursue future training opportunities.

Pagliari says that companies usually invest more in training for their high-income employees because they are further along in their careers and make a more direct contribution to their company's bottom line. In addition, she says, higher-income workers—because they already have specialized skills—often get more out of training because it's more targeted to their needs. But training of lower-paid employees can help companies attract and retain talent.



Best Practices:

1] Match training to jobs. Training should be related to employees' job requirements and the skills they need to perform their work. Choose a training program that will teach employees skills that are in demand in their profession or that they will utilize within one to two months of taking the class. This is the best way to ensure that employees get the maximum benefit, Pagliari says.

2] Prepare workers ahead of time. Make sure employees meet any prerequisites for their training and know enough about the subject (including what they want to take away from the course) to actively participate. If the training is not appropriate for employees' level of expertise, or if they lack enough experience and background knowledge, the training will be a waste of their time and the company's money.

3] Follow up. It's hard to tell how effective a training program has been until after the employees have been back on the job for awhile. According to Pagliari, a positive change in an employee's job performance is the best way to measure success.

Train Your Top Earners

Highly paid workers are more likely to get training—and are more likely to benefit from it—than their lower-paid colleagues.

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ESSENTIAL technology

FROM INCEPTION TO IMPLEMENTATION—I.T. THAT MATTERS

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Are you fast on your feet? CIOs will need to polish their footwork as networked devices begin to proliferate.

The Network Dance

BY FRED HAPGOOD

DEVICE NETWORKS | CIOs were invented because the boundless promise of IT generated an equally boundless swamp of confusion and technical perplexity. Ever since, CIOs have been by nature at least one part geek and proud of it—although that reputation sometimes has been a bit of a handicap when navigating the corporate ladder.

Several events on the horizon, however, suggest that the tone of the job may be changing. For better or worse, CIOs might be turning into people people. If so, their ladder skills might be in line for an upgrade.

Ironically, part of this trend is driven by the fact that networks are being transformed from systems with people at their nodes to systems whose primary role is the interconnection of physical devices, from locks and lights and cameras and motors to vehicles and bar-code readers and on and on. These new architectures are usually called device networks, or, in aggregate, “the Internet of things.”

The attraction driving this reconstruction is the promise of a huge increase in the flexibility and productivity of operations. Security cameras are an example. Today, in most cases, a guard sits at a desk, casually watching a half-dozen monitors—and that’s it. Maybe once a month he sees something worth noting. Network the same feed, however,

and sales can use it to assess the effectiveness of floor displays, personnel can monitor employee performance, facilities can watch the progress of cleaning and repair work, and so on. Suddenly, the system is contributing 7/52, if not 24/7. This point can be illustrated equally well with almost any other sensor or actuator, such as key-card readers, vibration sensors on motors, or motion detectors controlling the lighting and heating in bathrooms.

Networks are being transformed from systems with people at their nodes to systems that interconnect physical devices.

Of course, any CIO worth his reserved parking space will see an underside immediately. Device networking is not new. Twenty years ago people started hooking printers to the Net. What a nightmare that was. All the drivers had to be coded by hand. It took five years to get the technology in shape. Isn't device networking going to be a thousand times worse? The devices will face the same authentication and security any human user would, plus they will need to be maintained. Given that physical access to a lot of these devices will range from limited right up to impossible, how are those issues going to be handled? Compatibility is sure to be another headache. Devices will come in dozens of kinds, with several manufacturers for each. All these varieties, together with their upgrades, plus all the new devices no one has thought of yet, are going to need to interact seamlessly. The network specs are not even the same: Humans like lots of bandwidth but usually can tolerate reasonable latency; devices gen-

erally require very little bandwidth (except for cameras) but do best with low latencies (since they are interacting with machines).

Solutions for the Dancing CIO

But the modern startup culture is working quickly, and many initiatives are afoot (see "From Reliable to Convenient," this page) to automate or simplify these problems. Solutions are already being installed. Recently, Saddle Creek, a logistics provider with

warehouses around the country, networked all its bar-code readers (handheld, truck-mounted and wearable), enabling any manager anywhere in the enterprise to monitor the status of the equipment. The company uses technology from Wavelink to monitor device and network performance, download and install patches and upgrades, and control security definitions. Kathy Fulton, manager of technical services at Saddle Creek, calls this "distance management." "The need for onsite technical support has been taken out of the equation," she says.

The New World of CIO Politics

Beyond this mountain, however, lies another. The essence of device networking is moving static, single-constituency data feeds and control loops across borders, vocabularies and cultures, both inside the enterprise and up and down the value chain. Changes like these pose problems of recruitment, education and trust. These problems are political, not technical.

Earlier in this decade the Iowa Department of Transportation (IDOT) encountered these issues when it decided to renovate Interstate 235, the freeway running through the center of Des Moines. Highways have been enthusiastic users of IT since the '60s, when roadbed traffic sensors started to con-

From Reliable to Convenient

New technologies usually go through two phases. First, people look for reliability; once that is achieved, they buy convenience. Often, years separate these two stages. Device networking is so complex that it requires the two to develop in tandem. This is one technology in which convenience is reliability.

Today the first phase is being attacked by a number of middleware programs that might be thought of as operating systems for device networks. These address such issues as scalability, connectivity and maintenance. (Their sector name is mesh computing.) They come in three general flavors: proprietary (MillennialNet, SensiMesh), open-source (TinyOS) and ZigBee, the product of an industry consortium of the same name numbering nearly 200 companies. ZigBee 1.0, which was announced in June 2005, is optimized for allowing a large number—thousands—of extremely low-power devices to communicate wirelessly. Sample applications that might run on ZigBee include room-by-room sensing of utility consumption to allocate costs more precisely and improve conservation, and use of wireless monitors to define security perimeters as needed.

Convenience programs run on top of these standards. These programs, for instance, might be tools that sort devices into functional groups, so that all devices that perform one type of task can be addressed with a single command ("Turn off all the valves!"), or compression algorithms that decipher sensor data locally and transmit just the necessary bits, thus avoiding the need to pump huge amounts of trash over the network. (Especially useful in the case of cameras.) Until recently, most user companies wrote their own convenience programs, but today vendors are beginning to enter what appears to be a growing market.

—F.H.

Keep Up Online

Technology Editor Christopher Lindquist scours the **best of what's on the Web** when it comes to essential technology. Read his blog, **TECH LINKLETTER**, at www.cio.com.

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trol traffic lights. By the 1970s, highway construction projects routinely incorporated full-fledged star networks, with communications running back and forth between a control core and an ever-expanding list of peripheral devices, including dynamic signage, cameras, weather sensors and electronic toll collection.

All this experience has made highway engineers early adopters in the device networking revolution. Thus IDOT decided to make I-235's new intelligent transportation system (ITS) into a data-sharing platform that would accommodate the full range of devices and users, both current and potential. In this system, emergency vehicle call centers anywhere would be able to route responding units through the lowest traffic densities using images from surveillance cameras as guides. Citizens, even in other cities, would be able to consult the output of

ing that IDOT's system was just like that, only with a traffic situation instead of a building. The center thought it over and today is a happy user of the technology. "You have to get your feet in the door," Jackson says. "Without putting a guy in there to watch how they did business, we would have had no way of doing that." (You can admire the final result at www.i235.com.)

Why the CIO Leads

Under device networking, every data feed and control loop becomes a product or service that can be sold, bartered or used to sweeten some other deal. Suppose you have equipment that draws a lot of power but has some flexibility as to when it operates. If the control loop for that equipment is networked, you might be able to interest the local utility in trading a break on energy prices for the right to turn it on when uti-

Under device networking, every data feed and control loop becomes a product or service that can be sold, bartered or used to sweeten some other deal.

traffic-mapping algorithms. Interfaces would be open and standardized, so new applications could be snapped into place.

IDOT representatives began visiting the potential user groups, explaining the new system and its possibilities. Often they ran into education issues. One 911 center, for instance, said that while the system looked nice, the center was too busy to take on responsibility for managing another data input. The IDOT team members asked if they could come to watch operations. At one point, an IDOT rep noticed that the call handlers routinely ran searches in the data banks of the county assessor's offices to find photos of the property at the origin address of a call (to be able to tell responding units about building entrances). Michael Jackson, special projects engineer and manager of the project, jumped on the analogy, argu-

lization is lowest. Suppose your own product is a machine. If you build networked performance sensors into each one, every day, all the machines you have sold could e-mail you descriptions of their condition.

The Future of the CIO

Someone has to be responsible for identifying, creating, packaging and selling these deals. In theory, it could be anyone, but CIOs are probably the ideal candidates because in most enterprises they will be the only managers who are both network-centric and have a holistic view of the enterprise and its value chain. Fredrik Nilsson, general manager of network camera maker Axis Communications, points out that we already have at least one illustration of the argument: the central role of CIOs in the implementation of IP telephony.

ZigBee chipset sales in 2009 should exceed \$220 million with a compound growth of 116% from 2005 to 2010.

— West Technology Research Solutions

As the IDOT story suggests, these implementations require an appreciation of human sensitivities. For instance, suppose your company is inspired by the example of the security cameras. How are you going to tell security that control of "their" cameras is being taken away?

Nilsson suggests putting it another way. Instead, argue that since networked devices tend to be self-maintaining, device networking tends to liberate the department traditionally responsible for maintenance. Second, once a device is networked, pressure starts building from all directions in the enterprise to upgrade the devices and add to them.

In other words, networking devices usually leads to a larger system of higher quality, which is better for everyone, including security, which will get coverage of areas it never had before. Nilsson says that usually once such points are made, even people losing departmental control of their devices are happy to participate.

Of course, the proposition has to be made the right way. After all, consensus is built one yes at a time. Not every CIO will be up to the level of diplomacy required. Those who are, though, will be like mini-CEOs, practicing the kinds of skills that should give them a straight shot to the top. **CIO**

Freelance Writer Fred Hapgood can be reached at hapgood@pobox.com.

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What Can Tear Us Apart

Failing to educate our youth for science and technology careers and disrespecting our differences could have dire consequences for the unity of our nation

How many stars do you think will be in the U.S. flag in 50 years? It is said that CIOs operate in a cyberworld. But changes in technology, language and wealth can have a real effect on borders. So before you answer the question by saying “why, 50, of course,” you may wish to recall that no U.S. president has been buried under the same flag he was born under.

We oft take stability and continuity for granted and thus can make major mistakes in both our personal and professional lives. Countries do the same, and time and again they fall apart. Countries rich and poor, Asian, African or European, Christian, Buddhist or Muslim continue to split. The United States—indeed the entire American continent—have, so far, been extraordinary outliers. But the hemisphere may not be immune to the threats of techno-balkanization.

Technology accelerates integration and fragmentation. It allows noncontiguous communities to connect with each other and flourish. The Internet and VoIP turbocharge your ability to communicate continuously with people no matter what their geography. Alliances and allegiances flourish. The smart become ever more mobile; they know who is doing what where globally, and how they can fit in. Technology can leave many a country and individual far behind.

Countries that do not develop and attract smart people can fall very quickly. But you can also grow countries out of nothing. After WWII and the Korean War, there was not a lot left standing in Taipei and Seoul; Singapore had an income per capita similar to that of Ghana. Today Taiwan, Korea and Singapore are leaders in education and technology. When most of us were in college, Ireland was not usually associated



Make the Right Choice

As data protection and recovery grows in business importance, companies are turning to trusted outsourcers to ensure their data is protected and available.

As news of online fraud and data breaches hits the headlines, the issue of data protection has moved out of the data center and into the executive suite. The reason is simple: these days, how well a company protects and recovers its data could directly affect the bottom line. According to the Wall Street Journal, data breaches can cut about 1 percent from the stock price of affected companies.¹ But building a data protection strategy has grown in complexity as well as importance, and several trends highlight the new challenges that many CIOs face. Companies increasingly rely on technology to store and analyze vital business data, from customer contact information to financial records to intellectual property. That increased reliance can also result in vulnerability, as data losses that aren't quickly recovered can have disastrous business consequences. Alarming, much of that data has moved from the safety of a centralized data center to less-secure devices, such as remote servers in regional offices or laptops that are not regularly backed up. Moreover, the increase in government regulations that mandate how companies store, archive and secure particular types of data further heightens the challenges of data protection.

These business trends should drive a wholesale change in how business data is protected and recovered. Instead of building a disaster recovery plan centered only around the data center, companies must ensure that distributed data—on laptops, PCs, and remote office servers—can also be quickly and reliably recovered. Moreover, these plans must factor in the stringent security and recoverability mandated by the new regulatory climate. The bottom line: CIOs must rethink the way they protect and recover corporate data.

"The changes in the business world are reflected in the new approach that companies are taking to data protection," says Curtis Preston, vice president of data protection at GlassHouse

Technologies in Framingham, Mass. "Instead of just backup, data protection must encompass backup and disaster recovery as well as storage, security and archiving."

The answer is to build a strategy that both protects and recovers data. An effective data protection and recovery strategy not only restores data that has been destroyed, damaged, or misplaced but also prevents data from falling into the wrong hands and ensures that companies are in compliance with regulations affecting their industries.

"Businesses need a data protection plan that incorporates all corporate data, from the server to the laptop," says Brian



Babineau, an analyst at Enterprise Strategy Group in Milford, Mass. "And as regulatory compliance comes into play, we're seeing a convergence of data protection and security—you can't just protect it by backing it up. You need to secure it so that if it falls into the wrong hands, it can't be misused."

The key for any organization—regardless of its size or the industry in which it plays—is to implement a data protection and recovery strategy that mitigates business risks, reduces costs, increases compliance and helps improve overall business service levels. Doing so involves bringing together the business



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There should be reasonable, repeatable processes in place to make sure that only the right people have access. —Brian Babineau

managers and the CIO team to perform a multivariate cost-benefit analysis that assesses the value of business data with the costs of downtime and non-compliance.

Faced with both a high opportunity for failure and a great deal of risk, many companies are choosing outsourced managed data protection as the fastest, safest road to ensuring that data is consistently protected, secured, compliant and—most importantly—quickly recoverable. With such high stakes—many companies live and die on their ability to access and use data 24/7—choosing the right partner is a vital decision. Some of the things that should be evaluated include the following:

▶ **REPUTATION.** Trust is paramount in a relationship where so much is at risk, so look for vendors with an excellent reputation and a proven track record of helping companies successfully recover their data during regional or national disasters.

▶ **HIGH ACCESSIBILITY.** Enterprises need the ability to restore data themselves, regardless of whether it's in the data center, on a PC, or on a remote server. Electronic vaulting, for example, offers a secure Web interface that allows IT administrators to easily and quickly restore lost data themselves—a valuable commodity in an increasingly mobile world. Online access also allows companies to access and manage media, control authorization levels, declare a disaster and make media requests. "Self-service requirements are part of the consumer environment today," says Babineau. "They want the ability to get people involved, but they want the ability to do it on their own when they want."

▶ **MENU OF SERVICES.** As data protection and recovery increases in scope, so too must the services that data protection vendors offer. These providers should offer services that complement each other for a complete data protection and recovery strategy. Look for the ability to back up and recover both centralized and distributed data, as well as encryption and digital archiving.

▶ **DISTRIBUTED DATA PROTECTION SERVICES.** With critical data increasingly stored on decentralized sources such as remote servers or laptops, data protection vendors must offer a complete strategy to protect that data. Electronic vaulting offers services to automatically and consistently protect data that resides outside the data center, which not only ensures that backups are being done to set policies, but also guarantees recoverability.

▶ **SERVICE LEVEL AGREEMENTS.** Vendors should be able to tailor SLAs to the protection and recovery priorities of each customer, and offer a technology solution that supports each SLA level. Tape is an inexpensive solution for low-priority data, for example. Electronic vaulting, which backs up data online and offers on-demand recovery, provides easily manageable data protection with recovery points and recovery times that range from a few minutes to 24 hours, depending on service level requirements.

▶ **TOP EQUIPMENT.** Conduct due diligence to ensure that the vendor's infrastructure is everything you'd want. With electronic vaulting, look for best-in-breed encryption and a fully manned service operations center to monitor and manage services. With backup tape storage, look for high-end data centers, vaults with top-line security, gaseous fire suppression systems, backup generators and tight controls around temperature, humidity and static electricity.

▶ **SECURITY.** Security covers two realms—the physical security needed for facilities, personnel and media transportation, as well as encryption technologies for safeguarding sensitive data in transit, through electronic vaulting and on backup media. "There should be reasonable, repeatable processes in place to make sure that only the right people have access," says Babineau.

Consistent, secure processes for handling and transporting media from start to finish that prove chain-of-custody. "Look for vendors that properly handle and store tapes, from barcode scanning for chain-of-custody control, to the ability to electronically inventory the vaulted media," says Preston.

In the final analysis, implementing a comprehensive data protection and recovery plan requires an ongoing strategy rather than a one-off program. When the stakes are nothing less than business survival, data protection becomes a vital business issue—and using trusted experts to safeguard this asset becomes the most viable solution. By implementing a data protection strategy which includes choosing the right partner for data protection and recovery, CIOs can ensure that business leaders can depend on the continuing availability and integrity of the data engine that drives their organization. ▲



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with words like hardworking, focused, high-tech and rich. Now, after attracting world-class companies and entrepreneurs to their country, Irish citizens have incomes that exceed those of their former colonizers in Britain. Given that change can occur so swiftly, one might want to consider the consequences as fewer Americans pursue careers in math, science and engineering. Ever more leading-edge science papers come from abroad. Within a few decades, perhaps 90 percent of the world's scientists will live in Asia.

Flags, borders and anthems are myths; they last only as long as the next generation is willing to believe in and support what you today hold most dear. That is why flags have bred so promiscuously in the United Nations. When the organization was founded, there were 51 member states—today 191. Whether to untie is a daily debate in many countries today.

To generate wealth and grow, a country must generate knowledge and address internal divides. About one-third of the United States's PhDs in science and math are awarded to Asians and Asian-Americans—only 3 percent go to African-Americans and Hispanics. Within a few decades, 40 percent of the total U.S. population is likely to be Hispanic and African-American. Already 70 percent of the kids in the Los Angeles county school district are Hispanic. If large segments of the population do not become digital- and life science-literate, the engine of growth of the economy could begin to slow or stall. And there could be growing tensions between large ethnic islands.

The Widening Geographics Gap

There are also regional divides. Most of the country's wealth of knowledge is generated in a few key states. And within these states, the smart areas are concentrated in a few ZIP codes. In life sciences, for instance, 92121—the ZIP code between the Salk Institute, Scripps Research Institute and University of California at San Diego—is a key driver of growth and innovation. One consequence of this concentration of brains and research is that a few (mostly blue) states pay a great deal in taxes. And a series of mostly red states consume a lot more federal funds than they generate. Globally, when one begins to see growing regional gaps, one also sees demand for regional autonomy. Often it is the rich, not the repressed, ethnically or religiously divided regions that seek to untie first.

As schools lag and regions fall behind, investing today to reap tomorrow is ever more critical. But that is not what we are doing. The federal government spends about \$22,000 each on those over 65 and \$2,000 each on people under 16. We are investing more in what was, instead of what will be. It is the young who will have to lead change across a series of emerging fields including robotics, nanotechnology, IT and life sciences if the United States is to remain a preeminent economy. And yet many students are failing tests in science and math.

As teachers and researchers find it easier to work in some regions, many counties become knowledge irrelevant. Often these areas end up poor, isolated and angry. They begin to resent change, open borders and the tech-rich.

The country's debt is accumulating at an unsustainable rate. We make our kids pay for our inability to finance our own wars, infrastructure, health and education. Eventually they will pay, with interest. Soon, if interest rates rise and housing prices fall, we could be faced with some hard choices, and there are few things that stress families, companies and countries more than running out of money.

Ninety percent of the world's scientists will live in Asia.

Politicized religion adds fuel to an already volatile mix. Some national leaders use television to convince a large percentage of the population that the political opposition represents "godless people." The other side retaliates by loudly proclaiming the government is populated by a bunch of ignorant, dishonest monsters. Both sides try to ban what many other citizens hold dear. Some fear bans on Christmas, others prohibitions on stem cells and Darwin.

To grasp the possible consequences of today's divisions, imagine yourself sitting in a British Cabinet meeting circa 1900. Their flag and government represented the world's preeminent empire. Had the Prime Minister asked, "What do you suppose the map of our great country will look like circa 1955?" one might guess the consensus answer might have been just slightly wrong. Just as occurs in some marriages, where the spouse is the last to find out, often it is the citizens of greatest powers that never see a split coming.

So why not ask the question: What can we do today to prevent untying tomorrow? For starters, let's respond to divisive, hate-filled speeches by politicians with the question, "Are you seeking to untie us from the others?" Why not give parents of kids under 18 one proxy vote per child? Only then will there be a strong voting block to counter growing gray power. It is also time to quit spending more than we earn. And above all, it is time to realize just how fragile countries can be.

Whether the United States someday becomes an Untied States or whether it ends up a larger, more powerful country depends, to a great extent, on what we do today. How we cope with waves of technology, how we educate, what we invest in and how we treat each other. **CIO**

Juan Enriquez, CEO of Biotechnomy, is the author of *The Untied States of America: Polarization, Fracturing, and Our Future*. He is founding director of Harvard Business School's Life Sciences Project. He can be reached at jenriquez@yahoo.com.





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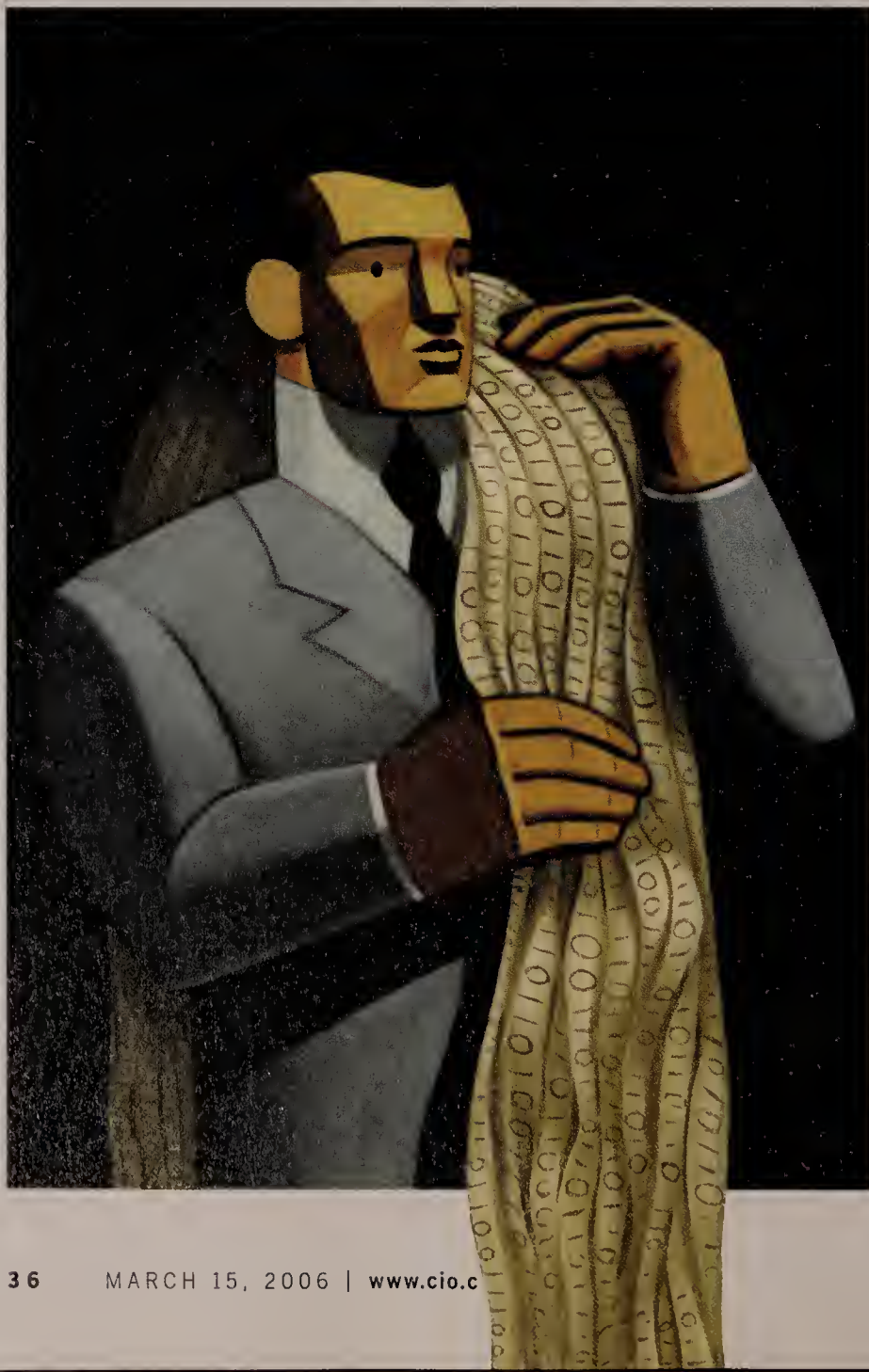
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Is Offshoring Coding Yesterday's Fad?

Outsourcing your code development makes a lot less sense with the radical changes in the way innovators now create software



Over brunch in a cheap Brooklyn restaurant, a longtime MIT friend proudly demonstrated his latest startup's software. The idea is clever, and its beta implementation is sweet. I liked it; usually the stuff I see turns my stomach. So I'm pleased that Hans Peter Brondmo's Web-based "personal information organizer" has technical chops and global business potential.

Then again, I usually pay close attention to Brondmo's digital designs. He's not an uber-geek who'd rather write code than chat up prospects. A reasonably successful entrepreneur, he's a get-it-done pragmatist who won't coddle programming prima donnas. He wants to hit the market cheap, fast and hard with products that aren't hard to upgrade or maintain.

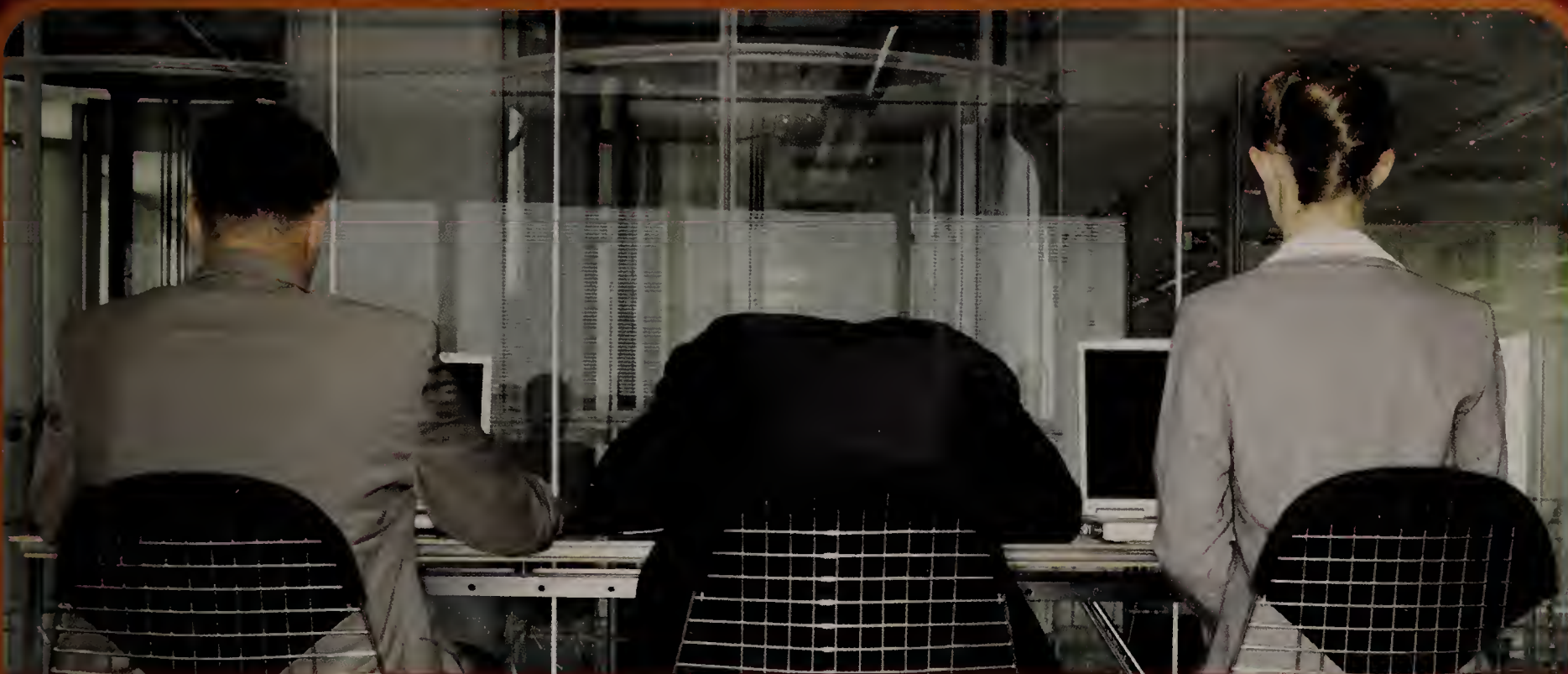
So when Brondmo told me his software, called Plum, was the first time he'd done serious coding in over a decade, I was taken aback. "I couldn't believe how much things have changed," he confided. "When my development teams wrote code 10 years ago, it took us three days to find and kill a bug. Today, it takes us only three hours."

What's more, he continued, whenever his (geographically distributed) development team runs into trouble, they can usually instant message their way into a just-in-time partnership that simultaneously solves the problem while alerting everyone to potential conflicts. "We do better real-time collaborative development and review now remotely than we did back at MIT when we were all in the same building," he notes.

Brondmo's favorite development discovery occurred when he was stuck for a few lines of code. He realized that by Googling he could see if anyone anywhere had posted something he could use. He and his team found quite a few virtual solutions

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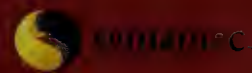


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this way. "But what about context?" I asked. After all, not everyone documents their C++ in English. He dismissively waved his hand: "Code is code. I found something that looked like what I needed in the middle of what looked like a bunch of Chinese. You paste it in and see what happens. It worked."

The ultimate result? He's never done a startup where the software development has been better, faster or cheaper. "In the past, I've had to raise lots of money to support the burn rate and the licenses necessary to develop real software over a couple of years; the costs are huge," he said. "You had to deal with the venture capitalists. They had the money."

"Development cost is still significant, but it's now focused on value creation, not infrastructure development," he added. "Open source and the availability of tools reduce our infrastructure cost. We don't have to pay for expensive software licenses and engineers to implement 'commodity' functions. So more money can be focused on innovation, not plumbing. We do more features faster. Development isn't really an obstacle."

Even allowing for hyperbole—perhaps Brondmo's "three

days to three hours" time compression is really closer to "two days to five hours," we're still describing at least a fourfold productivity leap. That's impressive.

Marry that to the evolving

array of development-oriented communication, collaboration and search tools spilling into the global digi-sphere, and the serious CIO might want to delay that Bangalore RFP. The new economics of software development may have rendered India and China yesterday's fad.

Plum's provenance may not be typical, but there's nothing extraordinary about it either. A savvy entrepreneur is exploiting technical innovation to cost-effectively generate technical innovation. The stuff works. This is where savvy CIOs need to sit up and take notice. The implementation implications are enormous.

I'm the last person to suggest that busy CIOs should immerse—or, God forbid, reimmerge—themselves in code. But any CIO preaching the gospel of productivity better know if his organization's methodologies discourage—or invite—healthy experimentation with these nascent development platforms. A CIO should know if he can now consistently get a year's worth of software development in 90 days. A CIO should know if 75 percent of a project portfolio can go to value-added features instead of infrastructure maintenance. This matters.

Transforming the economics of software development completely transforms the economic rationales for outsourcing. Reducing both the cost and time-to-market of new features and functionality completely transforms a company's economics of innovation. Ideally, CIOs should "own" these transformations. Do you?

A fourfold productivity leap and better communication tools could make CIOs rethink the Bangalore RFP.

Three clear implementation transformation scenarios emerge. The first scenario is the easiest and most obvious: These development economics create a new generation of Salesforce.coms and other ASPs that offer suites of mix-and-match business processes for enterprise consumption. For example, while Brondmo has given little thought to Plum as an enterprise "knowledge management" platform, it could easily be adapted to become one. With a little goosing, it could become an "account management" app too. More choice, less money.

Toward Value-Added Innovation

Scenario two has IT recommit to enterprise software development. These tools and technologies turn the internal economic equations for IT investment away from outsourcing and toward value-added innovation. IT becomes a better, faster and cheaper innovation partner for both key business units and core enterprise processes. ERP systems are goosed and spruced by customized Web apps instead of extended by packaged procurements like Siebel or PeopleSoft.

The third scenario has IT bypassed by ambitious business unit leaders who can't—or won't—wait for the CIO to get his act together. So they pursue scenario one and scenario two-type behaviors independent of whomever the CIO is and whatever the CIO wants. Like the rise of the software spreadsheets more than 20 years ago, the rise of Plum-like digital platforms and processes proceeds without the need for central approval.

Scenario-three CIOs will have a hard choice: Either be seen as enablers and champions of creative enterprise interoperability or get used to losing a lot of fights.

My personal belief is that the variation IT's been witnessing since 2000 will accelerate: The "IT doesn't matter" crowd will continue to manage and invest in IT as a commodity, while the "strategic IT" companies will be exploiting these new development economics for better and faster differentiation, segmentation and innovation. These emerging economics will further fragment the CIO community. The rich will get richer; the smart smarter; and the not-so-rich and not-so-smart will find themselves struggling to remain "fast-followers."

When you look at the core economic dynamics driving software development and business competition, it seems painfully clear: There has never been a better time to be a smart CIO at an organization that wants to win. **CIO**

Michael Schrage is codirector of the MIT Media Lab's EMarkets Initiative. He can be reached at schrage@media.mit.edu.



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Are you taking advantage of the new economics of software development? Tell us how, by going to the online version of this column at www.cio.com/031506.

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Opening a Virtual Gateway to Better Health

This CIO swore he would stay away from turnarounds—until he was offered the opportunity to revamp the way Massachusetts residents obtain state health services. It was a challenge he couldn't resist.

BY LOUIS GUTIERREZ



In early January 2003, I received a call from a former colleague, Steve Kadish, who had just been appointed undersecretary of Health and Human Services for the incoming administration of Gov. Mitt Romney in Massachusetts. Steve and I had worked together in Massachusetts government in the mid-'90s, when he oversaw operational services for the state; my role was that of chief information officer for the state. Then from 1999 to 2002, we both worked on the turnaround of Harvard Pilgrim Health Care, an HMO. After that intense experience, I promised myself that I would do no more than one turnaround every 10 years or so!

But this promise was soon to be broken.

Steve was calling to ask if I would consider coming back to state government during a fiscal crisis to lead the IT operation of the state's Health and Human Services agency amid the most significant reorganization in its history. Doing so would put me back in the middle of a significant "turnaround," albeit in a public-sector context. And it would entail a jolting salary adjustment from the consulting work I was engaged in at the time. But it was an irresistible challenge to me, because of the tremendous opportunities in government to help individuals and communities, using information technology.

What followed is an adventure that resulted in something many people thought could not be accomplished—a virtual gateway to the 17 Health and Human Services (HHS) agencies in Massachusetts. For decades, these agencies operated separately and constructed separate systems within their own fiefdoms. Each had its own business processes (for common tasks like applying for benefits and eligibility determination) and used different forms to collect similar data. HHS was

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referred to as “the maze” by human services advocates.

Less than two months after the start of his administration in 2003, Gov. Romney announced that as part of his plan for reorganizing HHS, he was going to build a virtual gateway to eliminate the maze that providers and beneficiaries had to navigate to work with HHS—at the time a \$12 billion leviathan. In his proposal, the core administrative functions of HHS (IT, HR, finance) were to be consolidated, the HHS executive office would absorb the entire state Medicaid program, and the 17 agencies would be grouped into four core service areas.

We spent the first 10 months of 2003 thinking, planning and architecting an IT strategy for HHS. We focused on which business processes were most in need of improvement, and which improvements were most affordable. We singled out intake (filling out applications for benefits), eligibility determination and referral (letting applicants know of related services that may be helpful) as the processes we wanted to streamline and standardize first. Some states have attempted this kind of streamlining by replacing the underlying systems with newer, more comprehensive software. We lacked the money and felt too much time pressure to go in that direction. Instead, we decided to create a common portal to the 17 agen-

Instead of asking “What is the ultimate scope?” we identified the best services we could afford to build.

cies, connecting the legacy systems with a service bus that would enable business processes to span systems.

Today, a single online electronic form provides access to the state’s Medicaid, food stamps, WIC (the nutrition program for women, infants and children), subsidized child care, veterans services, care for the disabled and many other HHS services. Hospitals and community health centers in Massachusetts can now check for any preexisting insurance coverage for low-income patients, and if none exists, immediately enter Medicaid application data online. This more inclusive coverage approach encourages preventive care rather than expensive emergency room care, and has reduced the burden to the public of paying for a large “uncompensated care” population.

This was a very complex undertaking, executed in a nearly impossible time frame. Even today, I wonder: What came together to make this happen?

Just-in-Time Development

As with any system design effort, particularly in government, scope creep can put extravagant demands on schedule and resources. After several months of somewhat fruitless attempts to get agreement on the exact dimensions of the gateway, we hit upon a strategy that worked very well: We decided to time the releases of the gateway using a rapid application design tech-

nique. Instead of asking “What is the ultimate scope?” and imagining an artificial completion date (with everyone’s wish lists incorporated), we would identify the best set of services we could afford to build during the fiscal year.

We used a J2EE enterprise architecture to link the virtual gateway with the agencies’ legacy systems. We chose to go in the direction of J2EE standards because they offered the greatest scalability and flexibility over the long term. We also chose to adopt a Web-based intake form application Deloitte Consulting had built for Pennsylvania. Deloitte performed the principal virtual gateway integration work, which entailed porting its application to a Java code base, and helping to orchestrate the connection of three existing systems—one using Cobol on the mainframe, another using Oracle on a midrange platform, and the third a SQL server/.Net system—to an enterprise services bus implemented in BEA WebLogic.

The Gateway Goes Live

At 11:30 a.m. on Aug. 12, 2004, the virtual gateway release one (for intake, eligibility, and referrals for Medicaid, food stamps, WIC and child care) processed its first online application. Since then, the system has processed over 164,000 applica-

tions and averages 3,000 applications per week. The first release cost less than \$8 million, including software, hardware and services. Subsequent releases have added intake for programs such as veterans and disabilities services and

entirely different processes—for instance, helping with census management for homeless shelters.

In December 2005, an independent group known as Community Partners surveyed health-care providers about the virtual gateway. The survey found that the gateway not only made the job of frontline workers easier and significantly reduced the time necessary for an eligibility determination but also improved the experience of most Massachusetts residents in applying for benefits.

I can’t say enough about the team that engaged in this effort. The development and operations teams worked virtually seven days a week for two months prior to the launch. And they’re still going the extra mile. People poured energy into this project because they felt it mattered. For me, the project was especially instructive as an example of how an open, standard framework allows multiple systems to interoperate. Many opportunities of this sort are yet to be explored among government agencies. I have recently accepted the role of state CIO in hopes of doing so. **CIO**

Louis Gutierrez, recently CIO of the Massachusetts Executive Office of Health and Human Services, is now CIO of the Commonwealth of Massachusetts, a position he also held from 1996 to 1998. He can be reached at louis.gutierrez@state.ma.us.



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Untangling



When **MIKE BENSON**, CIO of DirecTV, had to renew his telecom contract, he looked to an outside vendor to sort through a thicket of voice, data and networking services.

PHOTO BY MARK ROBERT HALPER

Telecom

How to Get More and Spend Less

Negotiating for networked telecom services is now largely the responsibility of CIOs. Fortunately, help is on the way.

BY THOMAS WAILGUM

Reader ROI

- Why the telecom industry is in flux
- How you can negotiate fair contracts with carriers
- What CIOs need to know about the future of networked services

MIKE BENSON WASN'T looking forward to negotiating his new telecom contract. The CIO of DirecTV had invited his existing provider, AT&T, along with rivals Sprint and Verizon, to bid on DirecTV's new contracts for 2006. Benson wasn't just negotiating for the satellite TV company's local and long-distance communication needs but for all of its voice, data and networking services. Not only would he have to untangle the telecom carriers' incredibly complicated pricing on current services, but he would have to figure out which could offer the best deal on new networking technologies such as VoIP telephony and multiprotocol label switching, or MPLS. And he knew that if he switched from AT&T to a different company, it could take up to two years to complete the transition.

"[The carriers] will assure you the migration will be fine," Benson says. "But in reality something will always go wrong."

Making the right decision is a big load on Benson's mind. And he is not alone. Now that telecom and IT have converged of late into networked IT services, the responsibility for negotiating and managing telecom contracts in an increasing number of companies has fallen to the CIO. And many are not prepared for the challenge. According to a survey of IT execs enrolled in The Ohio State University's CIO Solutions Gallery program, telecom contracts are the source of most CIOs' greatest long-term strategic confusion and biggest all-around tactical, day-to-day administrative frustration. And they openly acknowledge it is their sector of greatest ignorance.

To make matters worse, the telecom arena has never been so chaotic. Deregulation has created a thicket of carriers offering long-distance, local, wireless and networking services at unpredictable rates. These carriers use dozens of different billing formats, and CIOs regularly complain about errors and overcharges.

"The question becomes, which horse to ride? Go with the blue chips or go with the Vonages?"

—JAMES M. SMITH, ATTORNEY

While the past year has seen unprecedented megamergers, most notably the marriage of SBC and AT&T, these M&As have done little to clear up the confusion. The costs to corporate America couldn't be higher, in large part because the networking services offered under the telecom umbrella are more sophisticated—and more crucial to enterprises' day-to-day operations—than ever before. "Many people think of telecom as a cost, and it is, but it provides a function we can't live without," says Lisa Pierce, vice president of telecom and networks at Forrester Research.

According to Aberdeen Group, the average Fortune 500 company spends \$116 million each year on telecom services (for mid-market enterprises, it's \$26 million). According to several telecom sources, telecom costs have jumped into the top three line items for most companies. In addition, up to 12 percent of telecom service expenses are erroneous. Such errors result in an estimated \$8 million a year in lost profits per company, according to Aberdeen Group.

"It's not hyperbole to state that networks and telecom are the worst managed function in IT," says Eric Goodness, a research VP for managed and professional network services at Gartner. "There's anarchy and a total lack of governance."

But a few CIOs have found a path through the telecom jungle. Some have turned to third-party telecom expense management vendors, or TEMs, that know the lay of the land and can help CIOs through contract negotiations and billing problems. Others are saving on long-distance telecom costs by rolling out small-scale VoIP deployments. CIOs and analysts interviewed for this article offer valuable insights and examples of how they're contending with the spiraling costs of today's telecom.

If CIOs don't grab control over their telecom spend now, "they will be behind the eight ball," says John Nallin, the vice president at UPS in charge of worldwide telecommunications. "The best defense is a good offense."

THE NEW TELECOM LANDSCAPE

For nearly 100 years, there wasn't much to managing telecom. AT&T's Bell System had a monopoly on everything, and its prices were, for the most part, nonnegotiable. The breakup of AT&T in 1984 and deregulation of telecommunications in 1996 ushered in a new era. Copper changed to fiber. Network capabilities expanded. And IP became the de facto networking standard in the Internet age.

Along with new choices came new complexities: dozens of telecom suppliers offering local, long distance, wireless and networking services at various prices in a bewildering array of billing formats. For the most part, though, the brand-new competition led to consistent reductions in telecom spending every year.

Within the past 10 years, however, the telecom landscape shifted once more, and no event was more jolting than when the IT department and the telecom folks entered into a sort of arranged marriage. Because IT ran data networks, and telecom carriers were increasingly providing network-based services (for WANs and LANs), and voice could now run over networks (VoIP), all of telecom was rolled under IT's umbrella. Networking became even more critical—computers that can't talk to each other are essentially useless—and CIOs set out to upgrade their network infrastructures to keep up.

For some enterprises, the process of upgrading their networks has become a

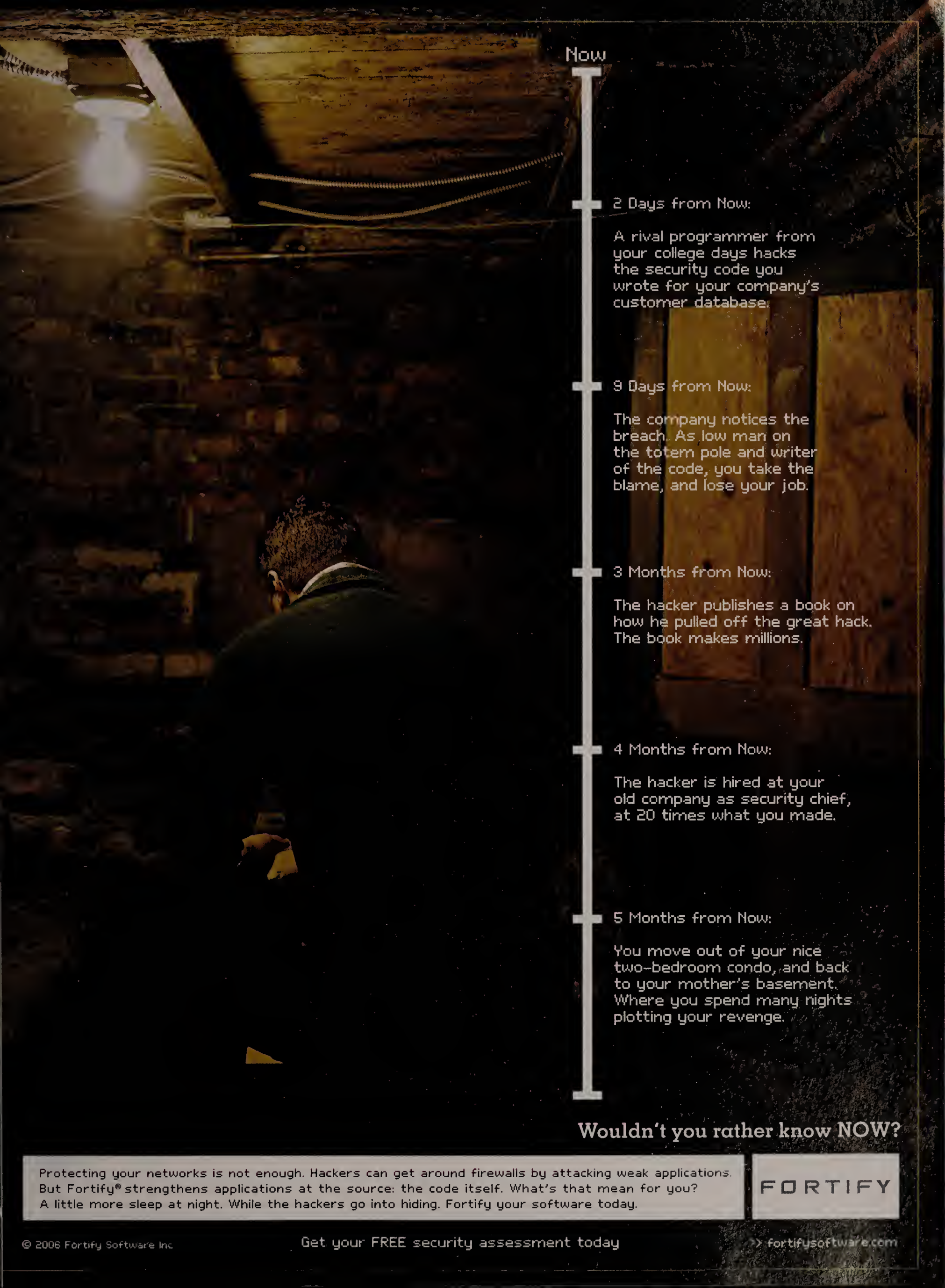
Sisyphean task. "It's like painting the George Washington Bridge," says UPS's Nallin. "When we get three-quarters of the way down the bridge, and we look back, we know we're going to have to start painting it again when we get done."

Carriers themselves are still operating with legacy databases and networks that were designed to carry only basic telecom services. Today, telcos are still trying to upgrade their systems to efficiently transport today's data, voice and video offerings to keep pace with new competitors. (Verizon, for one, is spending \$20 billion on its fiber-optic overhaul.)

Threats to carriers' once-protected revenue streams are everywhere—from VoIP companies such as Skype and Vonage to cable providers such as Comcast and Time Warner. And then there are the IBMs, CSCs and EDSs of the world that offer an outsourced pain reliever for all CIOs' telecom headaches.

"There's tremendous confusion in the marketplace with all of this consolidation," says James M. Smith, a telecommunications attorney at Davis Wright Tremaine and a former telecom executive. "For CIOs, the question becomes, What does the future bring, and which horse to ride? Go with the blue chips or go with the Vonages?"

Even today, CIOs still fight the entrenched executive view that telecom costs should always decrease. What CEOs and CFOs don't necessarily understand is that the enormous productivity and efficiency gains they've seen in their enterprises in recent years have been an outgrowth of the new networked telecom infrastructure. And their networks' bandwidth needs will only continue to grow, putting added pressure on CIOs to explain why telecom is so vital to the company's future.



Now

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9 Days from Now:

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3 Months from Now:

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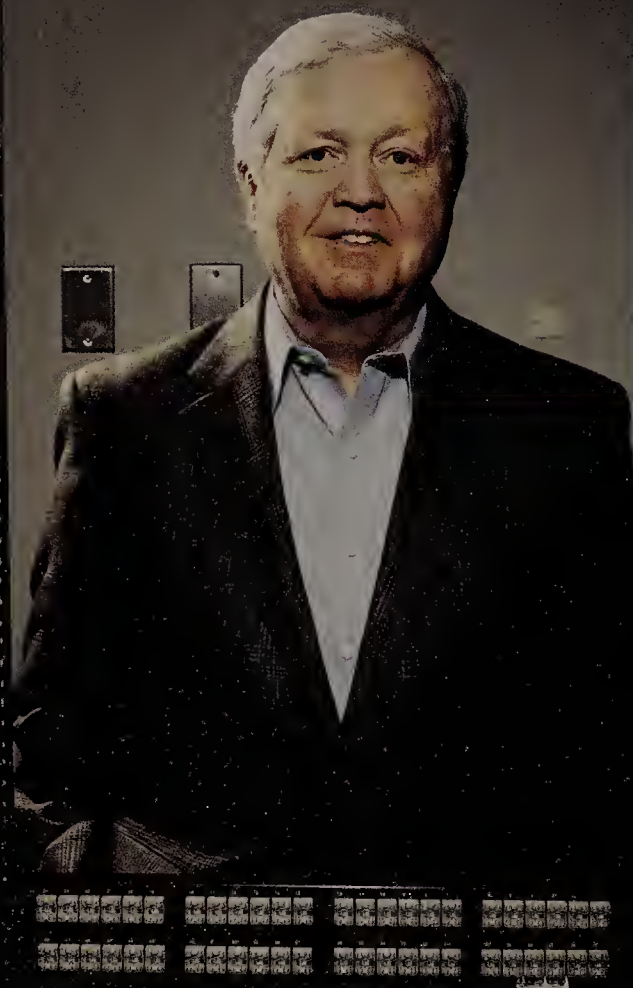
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To help him navigate the telecom jungle, **JOHN NALLIN**, VP of worldwide telecom at UPS, belongs to a consortium of companies that share information on rates for services.

"The networks are the veins of the company, and we're bandwidth junkies," says the global network manager at a worldwide manufacturer of retail goods. "We're a company that lives and dies on top of [the carriers'] services."

THE DEVIL IS IN THE (PRICING) DETAILS

The vexing challenge for CIOs in this new era is figuring out just how much telecom rates should be, and then negotiating fair deals with the plethora of providers that offer various networked services. Telecom contracts, which can contain hundreds of pages of obscure terminology and restrictions, can confuse even the most legal-minded CIO. "Sorting out the legal gobbledygook to get a contract on anything [related to telecom] takes as long as it does to put the project in," UPS's Nallin says.

Prices can vary widely between service providers, and CIOs have no way of knowing whether the prices they are being quoted by various carriers are competitive or fair. "What becomes difficult is how do you stay current with the new rate structures and contracting approaches," says Tom Lesica, senior vice president for global information technology and business operations at Avaya. Lesica just went through an RFP with the carriers that included 12 telecom services. "It's difficult for me or for my team to constantly go through the day-to-day, week-to-week fluctuations [in prices]," he says.

One carrier tactic that muddies the waters is called margin balancing. The telecom carrier will give the CIO a low rate on an 800-number, but not point out that the rate being quoted on something else (such as data services) is actually 40 percent above the going rate. "It's difficult to know the price points that CIOs should be aiming for," says Charlotte Yates, CEO of Telwares, a company that specializes in telecom contract negotiations and maintains historical data on carrier rates. "You might as well have a dartboard."

For guidance, companies used to be able to look to *Deal Watch*, a compendium of carrier rates published by the Center for Communications Management Information (CCMI). Publication ceased last year because



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carriers stopped providing specifics—only wide ranges on services, such as voice and frame relay, even though the Federal Communications Commission requires rate disclosure. According to Bill Goddard, product manager at CCMI, the range of rates on frame-relay service, for example, can run anywhere from \$32 to \$40,180 per month. (To see a comparison of AT&T's publicly disclosed rate contracts, go to www.cio.com/031506). "They're posting data publicly, but it's absolutely no use to anyone," he says. The carriers are able to get around the FCC requirement that they must "publicly disclose" their rates because that term is so unclear. CCMI filed a formal complaint with the FCC, and it's still waiting for an answer. "The FCC has stuck its head in the sand and wrote a nebulous order and is not particularly stringent about the enforcement," Goddard says. "As an end user it becomes extremely difficult to determine what the market rates are."

Not only can executives no longer get comparative pricing information but in some cases carriers have actually inserted legalese into the contracts to block CIOs from comparing their telecom rates with other CIOs and then bringing those rates to the carriers' attention during negotiations, according to Yates. CIOs should be alert to such clauses because talking to your colleagues is one of the best means of obtaining comparative pricing data.

CIOs may believe that the more services you purchase from one vendor, the lower the rate it will quote you. But experts say that is not so. Telwares' data shows that small companies receive just as many lower-priced deals as the big boys do. Therefore, going with one carrier isn't always the best solution for large enterprises.

Carriers say that they're not out to deceive

The Telecom Roller Coaster

Here's a sneak preview of how the industry will shake out in 2006

HISTORICALLY SPEAKING, 2005 will be remembered as a year of massive telecom consolidation. SBC and AT&T merged, as did Sprint and Nextel. Verizon got the government's go-ahead to buy MCI. Fierce competitors joined up, leaving the big three: AT&T, Sprint and Verizon. It almost seemed like old times. "Five years ago, companies were flooding into this marketplace," says James M. Smith, a telecommunications attorney at Davis Wright Tremaine and a former telecom executive. "Now, they don't exist anymore. They've been swallowed up by Bell operating companies." Or they've gone out of business.

The impact on the CIO is twofold.

First, CIOs should prepare for service disruptions, increased billing errors and customer service irregularities. Most of the value of a merger comes from integrating the business and operational support systems. The consequence of most M&As is at minimum a two-year period of operational and innovation

disruption for enterprises, a Forrester Research report says.

Mark Keiffer, AT&T Business's chief marketing officer, acknowledges that there's been a lot of "noise" about the newly merged systems and customer service levels. Keiffer says the new AT&T will honor all existing contracts. (The other carriers have pledged similar arrangements.)

The second issue for CIOs is the all-important economic question: Do fewer competitors mean increased prices? During the late '90s and into early 2000, a lot of competition meant cheap prices for ATM, frame relay and T1 services. In 2003, a T1 went for \$1,800. In 2005, it's less than \$400, says Keith Nissen, a senior analyst at market research company In-Stat. "Now, you don't have that competition, and what's happening is that the IT departments are not able to get the price concessions that they had before," says Nissen. "Prices may be going up a bit." —T.W.

their customers. "It's possible that I could trick a customer [during contract negotiations]," says John Irwin, vice president and general manager of BellSouth Business, but he says he knows he'll lose such customers when they figure it out. There's very little loyalty in telecom to begin with. As for the negotiations, Irwin says his customers rarely pay the "sticker price." CIOs might not always hit their ideal, Irwin says, "but they're going to be in spittin' distance."

However, Irwin does acknowledge the difficulty of the CIO's negotiation position.

"Probably there's no foolproof way to make sure that [CIOs] are getting the best deal possible," he says.

HOW TO AVOID THE BILLING QUAGMIRE

Because they deal with so many carriers for networked IT services, companies big and small are awash in telecom bills. According to Aberdeen Group, the average mid-market enterprise processes more than 3,000 telecom-related bills per year; for the average Fortune 500 company, it's 15,000.

The most vexing challenge for CIOs is figuring out just how much telecom rates should be, and then negotiating fair deals with the plethora of providers.



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The cost of just processing these bills (with no auditing for errors) is \$9 to \$15 per invoice. Conservatively, this equates to an average of \$135,000 in processing costs for big companies and \$27,000 at midsize companies—and that's just to keep on top of the volume.

Now think about this: Gartner estimates that up to 14 percent of telecom charges are in error. Finding those errors (think needle in a haystack) and getting the carriers to reimburse your account is arduous. Meta Group says 20 percent of the problem is finding the error; 80 percent is getting the carrier to pay up. Carriers are even imposing a statute of limitations on their customers seeking compensation for billing errors. Basically, if you can't find the billing error (say a telecom service was ordered but wasn't installed correctly) within a certain time frame—say, three months—you can't get that money back from some carriers.

In order to process an invoice, telecom analysts need to look over each bill (some on paper, some on CD-ROM) and audit it against terms of the contracts as well as against tariff and service guidelines, tax charges and physical telecom inventories such as the number of circuits. Every month. A VP of telecom procurement at a global financial services company says her division alone receives 7,000 to 8,000 bills per month.

"And we are one of many divisions," says the woman, who asked not to be identified. Her company has outsourced, insourced and outsourced again the billing and expense management. Her group would need about 20 or so full-time staffers to scrutinize and pay telecom bills in-house, she estimates.

According to TEM vendor Control Point Solutions, simple billing errors can take 60 to 120 days to resolve with carriers. Examples: A special contract price is not applied to a service; circuits or phone lines are taken out of service but never removed from billing; and a company is double-taxed on multistate services.

Complex billing errors can take much longer to resolve. For example, say one company acquires another. The acquiring company must notify the telecom provider and request that the acquired company have all

its billing tied to the master service agreement of the acquirer in order to get the same discounts and pricing. It can take up to a year to ensure that all billing and documentation is correct and that the carrier doesn't slap the acquiree with early cancellation and other commitment penalties, according to Control Point.

For a public company, there are key cut-off dates when accounting needs to report finances for the quarterly statements. If there are outstanding expenses that suppliers haven't sent the company, accounting folks must estimate that amount. Processing telecom invoices (which come at varying times during the month) along with billing disputes and outstanding credits are huge problems because those can produce significant revenue swings. And CIOs bear the brunt of the finance department's frustrations.

"I'm getting the tar beaten out of me" by the finance staff, says the global network manager at the worldwide manufacturer of retail goods. "Finance says, 'Dammit, why can't you do it month-to-month properly? It's \$200,000 one month; the next month it's \$100,000.'"

HOW TO FIGHT BACK

Despite all the heartburn, CIOs do have some alternatives for restoring sanity to their telecom situation. Now is the time, for instance, to lean on the carrier relationships you've developed over the years. "The merged companies don't want to sit by the wayside and see their customers being taken away from them," says UPS's Nallin.

Other IT execs and telecom analysts concur that now is a perfect time to play vendors against each other (as well as the cable companies) in negotiations. The global net-

How to Get the Best Value from Telecom Carriers

Five steps for success in 2006

1 Prepare for the worst.

Plan for the potential negative effects of the recent industry consolidation. Possible impacts include stabilizing prices with the potential for increases, degradation in account support and network hiccups due to network consolidations.

2 Inspect contracts.

Conduct a thorough review of your telecom contracts to identify any deficiencies in pricing, service-level agreements, risk mitigation provisions and contract structure flexibility.

3 Benchmark deals.

Do not neglect the negotiation and procurement process for telecom

services. Most companies obtain suboptimal contracts compared with the current market.

4 Control wireless.

Proactively gain control and visibility over your wireless assets. Wireless will continue to be the fastest-growing telecom segment for the foreseeable future, and along with that comes increased expense and increased security risk.

Be flexible. Design your contracts with sufficient flexibility to maneuver and adjust to changes. In addition, you should be sure to include clear commitment adjustment provisions in your contract, whereby

you will not be penalized due to unforeseen events (business downturn, changes in technology and so on). Let's say, for instance, that a CIO is able to migrate some of his phone calls to a private network VoIP solution, which saves some money. But the commitment piece of the previous contract may still be in effect. "What looks like a big IT win, a year or two later, is a big shortfall," says Charlotte Yates, CEO of Telwares. To eliminate that possibility, Yates advises CIOs to add a "technology change" clause to the contract so that if a CIO does migrate to a new technology he won't be penalized for the savings. —T.W.

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To get the best deal, CIOs should spread their data, voice and networked service needs among various carriers.

work manager of the retail goods manufacturer, who asked not to be identified, recently de-installed some carrier services in his U.S. operations and had Time Warner Telecom fulfill them. And that got his previous carriers' attention.

CIOs have to use "the threat of moving away as a tool for leverage," agrees Jan Dawson, a research director with Ovum. He suggests that CIOs demand an annual review of pricing with each carrier and how those prices benchmark against the carrier's competitors.

It's incumbent on CIOs to spread their services to various players to get the best deal. "One vendor doesn't provide all of the services," says UPS's Nallin. "They just can't handle all of the coverage."

To help him navigate through the telecom minefield, DirecTV's Benson retained one of a growing legion of telecom expense management vendors. Benson's reasoning is simple: "I don't know what everyone else is paying," he says. According to a report from Forrester's Pierce, most TEMs offer provider selection and contract negotiation; onetime and ongoing bill audits and bill verification; inventory cleanup; bill dispute and credit resolution; bill payment; orders, changes and disconnects; and more. Some of the bigger players are Avotus, Control Point Solutions, MBG, ProfitLine and Vercuity (which owns Telwares).

Benson uses Telwares for his up-front contract negotiations. "They know what the going rates are," he says. Telwares also preps him for the negotiations: who he is likely to negotiate with, who the true decision-maker inside the telecom company is and how that person will react to what he says. He also has used Telwares in the past for some onetime bill audits, though he keeps the back-end bill payment duties in-house.

Like all outsourcing arrangements in a

nascent industry, there are danger zones. Forrester's Pierce calls the growing use of TEM companies a "pit of vipers" because engagements can quickly lead to massive scope creep once the TEM gets inside an enterprise. So first, CIOs need to ask themselves what is the specific telecom problem they are trying to solve. Then craft an RFP around those deliverables and make sure the TEM can realistically fulfill their wants and needs.

Though it seems obvious, CIOs need to check client references from the TEM company, and if a TEM company's bid is 50 percent less than everybody else's, CIOs should look to another TEM provider, Gartner's Goodness says. "A lot of [companies] have had bad experiences with [TEM providers]," he adds. Most bad experiences involve TEMs that overpromised on their capabilities and couldn't deliver the trumpeted savings.

UPS's Nallin has met with more than 20 telecom expense management vendors but ultimately declined their services. Instead he belongs to an ad hoc consortium of similarly sized companies that share information and benchmark rates for services "so we know we're in the ballpark," he says.

YOUR TELECOM STRATEGY FOR TOMORROW

Once CIOs figure out how to negotiate telecom contracts, they should still expect a steep learning curve with all the new network technologies coming down the pike. It is now up to the CIO and his network managers to figure out how to make VoIP and other cutting-edge technologies work—from a bandwidth, security and financial perspective—and achieve all the hyped savings. As they struggle to do that, CIOs have quickly learned that bandwidth constraint is a major problem. "We're always battling for bandwidth at different periods of time

during each day," says Nallin. "To manage that is a pain in the butt."

With all of that network complexity, changing service providers isn't like switching your long-distance service. (If CIOs decide to part ways early, expect to pay a substantial price to get out of the deal.) "As you move to more IT-based technologies, and you do VoIP and have a lot of applications dependent on the network, it's more difficult to switch out," says DirecTV's Benson, who at press time hadn't decided which carriers he would go with.

CIOs can turn to a carrier or outsourcer such as EDS or IBM to host the VoIP service. "Hosted telephony puts the responsibility back on the carrier or outsourcer," Goodness says. He notes that there's more risk in operating your own network. "If you run the best network in the world, you're not going to get that much of an attaboy," he says. "If the network goes down, you're out of a job."

For better or worse, carriers are going to play a big role in all CIOs' futures. It is, therefore, up to each executive to figure out a telecom strategy that maximizes his IT infrastructure's capabilities, keeps end users happy and doesn't break the bank. Which is no easy task in 2006. As UPS's Nallin notes, the CIO's success with the carriers will depend on whether "the vendor is managing you, or are you managing the vendor?" **CIO**

Senior Writer Thomas Wailgum can be reached at twailgum@cio.com.

Compare Telecom Rates and Services

To read CurrentAnalysis's comparison of the network services leaders and to read an excerpt from John Handley's book, **Telebomb: The Truth Behind the \$500 Billion Telecom Bust and What the Industry Must Do to Recover**, go to www.cio.com/031506.

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As it revamps its workflow processes, the FDA is relying on technology to reduce the risk that unsafe substances—such as the pain reliever Vioxx—will get into the market



n Feb. 8, 2001,

a U.S. Food and Drug Administration advisory committee met to discuss a study conducted by the pharmaceutical giant Merck that showed a disturbing increase in heart attacks and strokes among patients taking the arthritis pain reliever Vioxx. It appeared that FDA reviewers, before pushing Vioxx through its fast-track approval process in 1999, may have overlooked data from Merck's clinical trials pointing to potentially fatal reactions to the drug.

Three years later, in September 2004, public pressure and a high-profile lawsuit forced Merck to pull the drug off the market. Meanwhile, the case unleashed a storm of criticism against the FDA's approval processes, in particular its ability to assess all the information relevant to a specific medication before clearing it for public use. In the past two years, the agency has watched as drugs it approved for multiple sclerosis, diabetes and cholesterol were recalled by pharmaceutical companies. And the

FDA has been forced to issue increasing numbers of warnings for newly approved drugs that have turned out to have dangerous side effects, including most recently three drugs for asthma (Advair, Serevent and Foradil), which the FDA warned in November could cause severe asthma attacks and possibly death.

According to a report by the Government Accountability Office, more than 5 percent of all drugs approved between 1997 and 2000 were withdrawn for safety reasons. These withdrawals concerned drugs that got the green light during the period after Congress passed a 1992 law that encouraged faster drug approvals and resulted in a 200 percent increase in the rate of such withdrawals from previous years (the FDA disputes the study). Last November, FDA scientist turned whistle-blower David Graham told a Senate committee that his agency, under pressure to grant fast drug approvals, is "incapable of protecting America against another Vioxx."

Criticism has been aimed at the FDA's inability to properly manage the risks inherent in its business processes, but it may as

R for



Risk

BY ALLAN HOLMES

Reader ROI

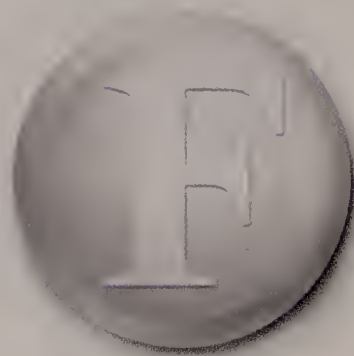
- :: How the FDA is using technology to manage drug approval risks
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- :: Why CIOs should assess risks outside their organization's control

well be targeting the agency's IT and the workflow the systems support. During the period in the late 1990s when many of the recently problematic drugs were being approved, the agency was under intense pressure from pharmaceutical companies and patients to fast-track potentially life-saving medications. But it was saddled with decade-old information systems that made it difficult for FDA scientists to access all the information they needed to make decisions quickly. The disconnect between new business processes and old IT magnified the central risk facing the 100-year-old agency: Moving too slowly *or* too quickly could cause injury or even death.

The FDA's high-wire act requires it to balance the demands of manufacturers and patients with competing demands from the general public to make sure the products are safe—while maintaining the trust of all these constituents. In the past, the FDA has hired more scientists and other support staff to keep it in balance, but, increasingly, FDA managers are concluding that IT has a central role to play in managing the agency's enterprise risks. "This agency is all about risk management," says acting CIO Fred Farmer. "Everything has a side effect, even an orange. And so when a drug comes through here, it's always a balance between what good is it going to do versus what harm could it possibly cause."

Neither FDA officials nor agency critics attribute the Vioxx disaster to ineffective IT. But in 2002, as the controversy over the FDA's fast-track process was building, the agency embarked on a full-scale modernization of the systems used to accept, store and manage electronic applications for new drugs and medical devices.

Most of the FDA's effort focuses on consolidating redundant systems throughout the agency's eight "centers"—the divisions responsible for approving products within the agency's jurisdiction. These products include not only drugs, medical devices and food, but also so-called biologics (such as vaccines), veterinary medicines, cosmetics and radiation-emitting products (such as mobile phones). The agency also conducts food inspections and issues regulations for food labels. Agency officials believe that decreasing the number of systems the



DA managers had not considered IT to be a central component to balancing the competing imperatives of caution and speed. IT was more of a support service.

agency must maintain and establishing data standards will help scientists share information more quickly and easily. With better access to information, they will make faster decisions based on better analysis.

Already the new systems—and workflow processes that have accompanied them—are showing results, says Stephen Wilson, acting director of the FDA's Office of Business Process Support in the Center for Drug Evaluation and Research (CDER). For example, the agency can now track a patient's reactions to a new drug during a clinical trial, increasing the likelihood that adverse effects will be investigated by the FDA. In the past, it could take weeks, if it was possible at all, to locate an individual's file. "IT allows you to be more comprehensive and to act more quickly, which lowers the risks all the way around," Wilson says.

A LEGACY OF RISK

The FDA's jurisdiction covers nearly every product that Americans ingest or apply to their bodies; its regulations affect 25 percent of the \$12 trillion U.S. economy. Therefore, any delay in getting these products to consumers has a financial impact on manufacturers and sellers, as well as on the health and satisfaction of the public.

On the flip side, FDA officials need to conduct scientifically sound reviews in order to understand a product's adverse effects. But the thoroughness of these reviews can slow down the approval process. Before Congress mandated fast-track drug approvals, reviews averaged about 15 months for high-priority drugs (those like Vioxx believed to have the potential to have an immediate and marked improvement in public health) and more than two years for standard drug applications.

For years, the FDA leaned on its reputation for taking things slowly to protect public health. But in 1992, after years of complaints from pharmaceutical companies and the

health-care industry that the FDA didn't move fast enough, Congress told the agency to put a premium on speed. That year, lawmakers passed the Prescription Drug User Fee Act so that the FDA could charge drug companies fees for new drug applications. The agency used the money to hire more reviewers and to invest more in IT to speed up the drug approval process. Paper applications for new drugs—stacks of some reached as high as six feet, brimming with stats from clinical trials—were part of the problem.

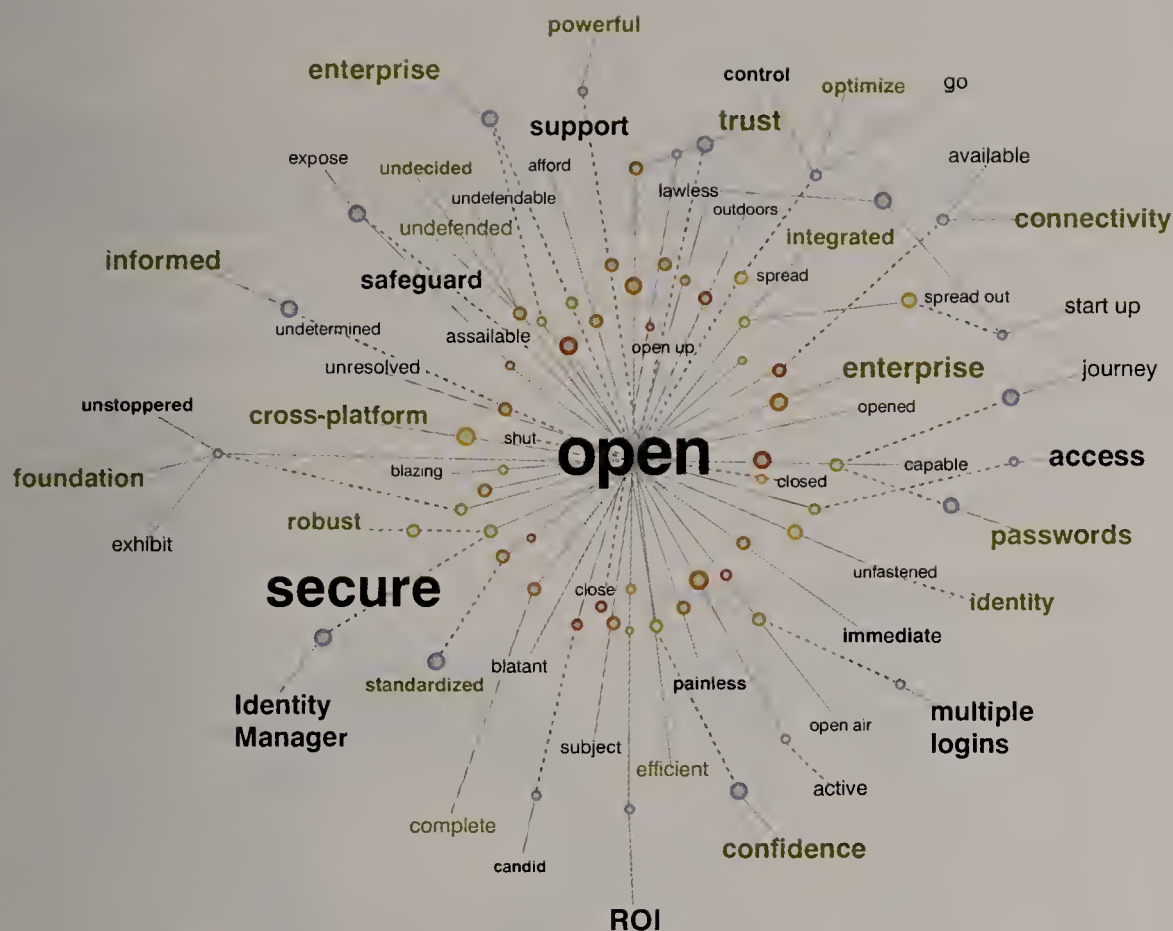
Previously, top FDA managers had not considered IT to be a central component to balancing the competing imperatives of caution and speed. IT was more of a support service, and scientists didn't question what the department delivered.

Meanwhile, IT planning or buying decisions were primarily made by the IT directors in each of the eight centers. The higher profile centers, such as the CDER, which handles drug approvals, got more money and better equipment. But even still, the FDA ran mostly on disparate legacy systems.

The FDA hasn't tracked how much of the \$1.5 billion collected in drug fees went to improving IT, but after 10 years, technology still wasn't helping FDA scientists with their decision-making process. The agency wasn't even keeping up with the basics. Former CIO Jim Rinaldi recounts that when he got to the FDA in 2002 he found 1,800 new PCs owned by the CDER that had been sitting in a warehouse for nine months, still in their boxes.

In a 2002 survey by the inspector general of the Department of Health and Human Services, 58 percent of the CDER scientists said they did not have enough time "to conduct an in-depth, science-based review" for drugs that were put on the fast track.

Around the same time, new approaches to treatment were affecting how the FDA did its job. The boundaries between drugs, biologics, medical devices and other FDA-



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regulated products were beginning to blur. For example, a stent designed to keep an artery open is coated with a medication that keeps blood from clotting. Is it a drug or a medical device? The expertise to review such a product resides in two separate centers, the CDER and the Center for Devices and Radiological Health. But they operated on different IT platforms, used different network technology, ran multiple versions of Oracle databases (with different data standards and nomenclature) and had their own security measures. The systems couldn't communicate, and thus, the scientists couldn't create the workflow necessary to do a thorough review of products that fell into multiple categories.

Under Rinaldi, the agency spent the first two years of the modernization project focused on reducing costs by revamping the IT organization and its business processes. In 2003, the FDA created a central Office of Shared IT Services, consolidating 15 contracts covering such services as help desk and desktop support. And in March 2004, the IT function was completely reorganized, so that the CIOs in each center reported directly to the FDA CIO, giving the agency CIO more control over technical standards and purchasing.

While these steps did nothing to directly

from taking full advantage of technology to reduce review times and provide more efficient access to the clinical trial data the scientists needed to make decisions on a drug's safety.

"We weren't thinking of risk management explicitly, [but] we were thinking of it implicitly," Rinaldi says. "The way we thought about it was, we knew IT was central to getting the right information to the right person at the right time. Only later did we start thinking that what we were doing was actually mitigating risks."

A MORE EFFICIENT WORKFLOW

The FDA had the foundation of a new workflow in a series of electronic applications for new product approval that it launched in the 1990s. But the forms weren't standard across the agency (manufacturers submitted their data using only paper forms). Meanwhile, there was no common system to accept and route the applications to the members of an FDA review team, and no concrete plans to create an automated workflow.

The Center for Biologic Evaluation and Research (CBER) was one of the most advanced, in that it accepted electronic applications in PDF form and had the beginnings of an automated workflow

in principle that they needed to automate their workflow processes in order to take advantage of the electronic application. The risk mitigation argument carried the day.

"Those in the centers who dealt with reviews every day were the ones who really got risk management, and how to make IT a part of it. It was obvious we had to start with how work flows through the centers," recalls Rinaldi.

Now came the hard part: devising a workflow that could be used by every center. Rinaldi could not simply transfer the workflow system from the biologics center to the drug evaluation center because the biologics center's workflow system could not be scaled to handle the drug center's workload. Rinaldi knew that if he tried to force the biologics center's solution onto the drug center, he risked creating a system that provided less functionality and that would not be robust enough to cut review times and provide better information to scientists.

Early in 2003, as the IT department reorganization was proceeding, Rinaldi and Farmer (who was director of IT programs at the time) convened a meeting with representatives from the FDA's centers to begin defining a common workflow. The group spent the first two hours in "spirited discussion" pointing out how each center's workflow processes were unique, recalls Leonard Wilson, the chief business enterprise architect at CBER, who is responsible for implementing CBER's managed review process. At one point, Wilson recalls, he noticed that each center performed the same tasks—they just called them different things.

Once Wilson pointed out the similarities in the centers' processes, the next hour of discussion focused on identifying the steps in the workflow process the centers had in common. And so on. "We had become inefficient in many areas because we simply had local language barriers," Wilson says.

That discussion led to two IT initiatives: the development of a single intranet, based on enterprise technology standards, which is currently being rolled out, and the beginnings of an FDA-wide automated workflow system, which is still under development.

The point of the workflow system is to give each center the components to create a



he agency is beginning to assess how it can use IT to address risks that come from outside its walls.

address the FDA's workflow problem, Rinaldi (who left the FDA last summer to become CIO at NASA's Jet Propulsion Laboratory) realized that consolidation could accomplish more than cutting costs. It could also mitigate the risks in the approval process that derived from incompatible systems by enabling new, integrated workflow processes. The media was hammering the agency about its Vioxx oversight. From his discussions with the center directors, Rinaldi concluded that the agency's legacy of incompatible systems was preventing it

process. Reviewers who worked for the biologics center could access the applications online, but members of the review team from other centers had to manually thumb through printouts of the files to find what they needed. Other centers relied even more heavily on the old manual processes. "That really slowed things down, and made it more likely that [reviewers] were getting out-of-date information" from the paper files they accessed, Rinaldi says.

Given the beating the agency was taking, it was easy to get the center directors to agree

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made.”

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Business Technology Leadership

workflow of its own, but still be able to integrate them. One component that Wilson is helping to develop is a standard webpage for scientific and regulatory reference information. When it's completed (it's now being prototyped), a reviewer will be able to select the type of product the application is for, then determine how to proceed with the review. Having this functionality, Wilson says, will make it easier to train new reviewers because the workflow process will be simpler and standardized. That in itself should enable the FDA to conduct reviews and grant approvals more efficiently, thereby giving scientists more time to do their analysis instead of doing paperwork.

MANAGING WHAT THEY CAN'T CONTROL

It's too early to measure the impact of the FDA's latest investments on its approval process. When it comes to drug approvals, the FDA has reduced the median time to review a priority drug from 15 months in 1993 to just under seven months in 2003, but IT contributed little to those gains. Farmer and the top managers in charge of workflow processes in the FDA's centers believe IT has the potential to shorten the approval time more, while reducing the risk that they will approve products that have dangerous side effects.

Meanwhile, the act of pulling together managers in each center has led the FDA to expand its idea of how to manage business risks using IT. Before the Vioxx fiasco, IT was expected to manage only the risks to its own operations—to guard against system failure, data loss and security breaches. The problems with the drug approvals got the agency focused on how technology could mitigate the risks inherent in its own business processes. The next step, which the agency is just beginning to assess, is how it can use IT to address risks to its mission that come from outside its walls.

"This is a very common reaction to managing risks," says Bob Charette, an enterprise risk management expert with consultancy Itabhi. "You manage the risks that you perceive to be in your control, not the ones you perceive are out of your control." And yet, good enterprise risk management requires identifying and deciding what to do about external risks.



im Rinaldi, FDA CIO until 2005, concluded that the agency's incompatible systems were preventing it from providing scientists with efficient access to clinical trial data.

For instance, the agency is developing an auditing application, through which FDA auditors could match the data filed by a pharmaceutical company to the data the company keeps internally. Such a capability could discourage pharmaceutical companies from hiding or changing data that may hurt the chances for a drug to be approved. (In December, *The New England Journal of Medicine* posted an online editorial claiming Merck had withheld data on heart attacks in Vioxx trials that would have raised warnings about the side effects of the drug.) "What that gives you is more ability to look at all the information in a more comprehensive fashion and bring forth questions," according to the CDER's Stephen Wilson.

One promising idea, according to pharmaceutical industry experts, is a system that would track the performance of drugs once they are on the market. Adverse effects from drugs in a clinical trial may seem statistically insignificant in a sample of 3,000 people, or the trial may not test for a particular side effect. But, as was the case with Vioxx, once a drug is on the market and 80 million people begin taking it, new or more pernicious side effects become noticeable.

Using an automated system, the FDA could more easily collect reports of adverse effects from health-care professionals so that warnings could be issued or drugs withdrawn from the market more quickly. The idea for such a system has been discussed for years, but it wasn't until 2002 that Congress directed the FDA to dip into the application fees paid by pharmaceutical companies to develop it.

An aftermarket tracking system might also illuminate ways the agency could improve the drug approval process, says Scott Gottlieb, a physician and deputy commissioner for medical and scientific affairs at the FDA. At its most sophisticated, such

a system could gather data in real-time from electronic health records, flag possible correlations between drugs and adverse effects, and rapidly report those to FDA officials.

Because the system has such potential to mitigate risks beyond the FDA's control, Charette thinks the agency should have made it a priority much earlier. Organizations need to identify the five biggest risks they face and tackle those first. The biggest risks tend to be systemic ones—risks that affect the entire organization but are perceived to be out of its control. "You don't build security into a system after it's [done]," Charette notes. "You build it in on the front end. It's the same with enterprise risk management. You consider [risk] when deciding what systems to build and what business processes to automate."

Gottlieb agrees that the FDA could have pushed harder, but cites such obstacles as a fragmented health system (in which there is little automation of health records), the need to protect patient privacy and a lack of funding (five years ago, the FDA estimated the system would cost \$200 million) as reasons why the agency has put off this development. Now, however, it is looking into tapping health insurance databases to search for drug effects and has begun to research system requirements. Rinaldi says there was no way he could even begin to convince FDA managers that an aftermarket IT system could help them until he fixed the atrocious state of IT throughout the agency. That was a bigger risk to the enterprise, he says, because it threatened scientists' ability to do their jobs quickly and thoroughly on every review.

Says the CDER's Stephen Wilson, "We're just beginning to look over the hill now to see what is possible." **CIO**

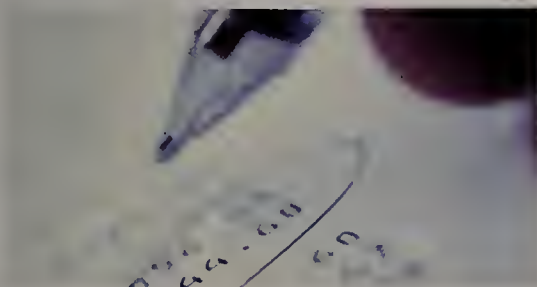
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Last year, CartManager International, a provider of online shopping cart and checkout software, sold personal information on 1 million customers to a third party for \$9,000. The data included names, credit card numbers, phone numbers and dollar amounts of purchases. Not only were those customers not CartManager's to begin with but selling their information violated the privacy policies of many of the merchants from which CartManager had obtained the information.

It was not a wise move.

Angry customers (who had been solicited by the company that bought their personal data) complained to the merchants that used CartManager on their websites. The merchants, in turn, complained to the Federal Trade Commission, claiming CartManager had violated their privacy policies. "It's simple," reads a privacy policy on a website operated by one merchant using CartManager. "We don't sell, trade, or lend any information on our customers or visitors to anyone." The FTC charged Cart-

Contrary to popular belief, protecting the privacy of customer data and making a profit are not mutually exclusive goals. Several leading companies have accomplished both.

BY ALLAN HOLMES

Reader ROI

- :: Why establishing strict privacy controls over customer data is good business
- :: How to manage the trade-off between protecting sensitive data and exploiting it
- :: Which companies have emerged as privacy pioneers

Manager with an unfair practice and levied a fine of \$9,000—equal to the amount the company had received from selling the information.

The size of the monetary penalty should fool no one. The real damage has been to CartManager's reputation. "This happened almost a year ago, and it still hangs out there in articles," laments Justin Hill, head of sales for CartManager. "It's hard for it to go away."

Truer words were never spoken. The issue of data privacy is not going away for any business or organization that stores, uses or sells personal data on customers or members. Recent publicity about personal data stolen or hacked from Bank of America and ChoicePoint has only heightened the public's concern over the security and privacy of information they provide to businesses.

This mounting concern is now affecting the future of online e-commerce. Even online banking—until this year the fastest-growing segment of online activity since 2000—is not immune. The percentage of Americans using online banking services has stalled at 39 percent after a period of blistering growth, according to an August 2005 survey conducted by the market research firm Ipsos Group. The primary reason: 73 percent of consumers say they are avoiding online banking because they are concerned that banks do a poor job of protecting their privacy, including selling personal information to other businesses, Ipsos reports.

The Profits



in Privacy

Tess Kolczek, chief privacy officer for E-loan, says her loan company attracts and keeps customers by asking permission before sharing personal information with other lenders

PHOTO BY ANDY FREEBERG

Data Security



Charles Giordano, associate director of privacy marketing strategy at Bell Canada, works closely with the marketing managers to make sure the telco's privacy policy is adhered to.

Although e-commerce is still increasing (holiday online shopping increased by 30 percent last year), 54 percent of consumers said they have curtailed online shopping because of privacy fears, according to a 2005 survey conducted by Javelin Strategy & Research. That concern translates into a loss of \$5.5 billion of annual online revenue, Javelin reported.

Faced with this backlash, state and federal regulatory agencies are beginning to respond. California has already passed strong privacy legislation that requires financial institutions to obtain permission from customers before sharing personal information with nonaffiliated companies. Another California law requires other businesses to report to customers if they share personal information with nonaffiliated companies. Twenty-one states have passed laws that require companies to contact customers if a security breach occurs. On a national level, more than a dozen data security bills have been introduced in Congress this year. They vary in severity, the strictest requiring all companies to notify consumers whenever there is a data breach and give those consumers the ability to see and correct information collected about them. Experts say some kind of legislation on data security and privacy will almost certainly be passed this year.

"There will be legislation to tighten up privacy," says Chris Hoofnagle, senior counsel for the Electronic Privacy Information Center. "And if not legislation, there will be more regulation."

Government intervention aside, many experts argue that care-

fully thought-out privacy controls make good business sense. Larry Ponemon, the founder and chairman of the Ponemon Institute, has some evidence to back up that assertion. He measured "privacy trust scores" for more than 1,000 companies by asking customers to rank on a scale of one to five how much they trust the companies with which they do business. For each company, Ponemon asked consumers more than 20 questions, including how much they believe the company is committed to protecting their personal information, how accurate and trustworthy they believe the information in the company's privacy policy is, and if they believe the company would do the right thing in a case of a data breach. From the rankings, Ponemon calculated weighted privacy trust scores for each company. The higher the score, the more consumers trusted a company. Ponemon then measured the rate at which consumers responded to marketing campaigns, be it direct mail or Web advertising. The higher the privacy score, the higher the response rate to marketing campaigns—and the higher the company's revenue. Taking measurements over time, Ponemon determined that just a 1 percent increase in a privacy trust score would translate into an increase of tens of millions of dollars in revenue.

"The perception of how well a company manages privacy has quite an astounding impact on sales," Ponemon says.

CIOs can play a major role in boosting their companies' "privacy scores." Because customer data resides in databases, it is the CIO who is in the position to suggest certain privacy policies and spear-

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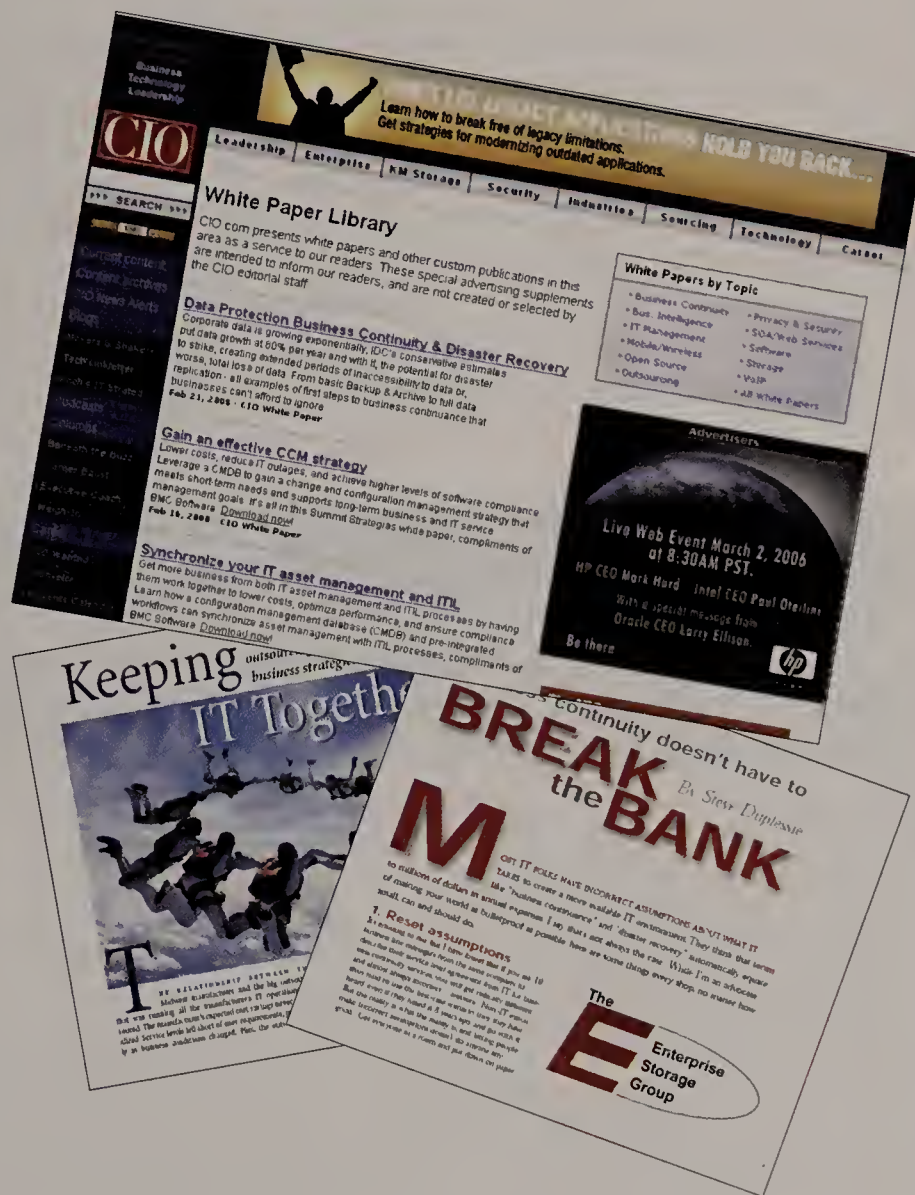
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head programs to put them into action. CIOs who work for companies with strong track records in this area say there are a number of ways IT can be used to enhance a company's privacy reputation. These corporate pioneers make sure privacy is part of every executive discussion about new products, services or internal use of customer information. And they ask their customers how they want their personal information handled. Furthermore, while most large companies offer an opt-out feature for customers who do not want their personal information used for marketing purposes or research (although even that feature is often hidden in the fine print of privacy policies), the pioneers routinely adopt opt-in, rather than opt-out, policies. And they have found that these practices help their companies improve customer relationships, ultimately contributing to a better bottom line.

"That's the real benefit of this," says Charles Giordano, associate director of privacy marketing strategy at Bell Canada and former associate director of data governance and strategy. "Opt-in and other privacy controls force you to look at the business value rather than just accessing customer information for information's sake."

Bell Canada and other privacy pioneers also give customers access to their personal data and closely monitor which employees have access to that data. They say privacy must be ingrained in the corporate culture, which includes nonstop education, making it a part of employee performance reviews and enforcing meaningful punishments for not adhering to privacy policies.

"Times have changed," says Alan Westin, head of Privacy &

American Business. "If you are the CIO, you have to go to the boss and say, 'It isn't like the old days. Unless we spend more money and more time on data security, our customer trust and reputation can go down the toilet.'"

Protecting Customer Data: A Cost/Benefit Analysis

Privacy policies that strictly protect customers' personal data may seem draconian, almost a noose around companies that rely on mining their customer data to better target new products and services, or that make a few bucks in selling lists to other companies. But good privacy policies are not dams. They are more like finely tuned control valves that direct the flow of information where customers—along with company executives—want it to flow for the best outcome.

That's why good privacy practitioners follow the first rule of valuing the information they have—figuring out what the information is worth to them in helping meet specific goals, be it better health or more revenue—versus protecting that information so that others cannot view or abuse it. That's the balancing act John Glaser, CIO at Partners HealthCare System in Boston, was faced with when developing the health-care organization's intranet. All health-care providers who have privileges at Partners' eight hospitals and medical centers and the administrative and clinical staffs (37,000 in all) have access to the intranet to check the electronic medical records of patients. Glaser knew the intranet must protect patients' records from unauthorized users, as well as from

Do You Know Where Your Customers' Personal Information Is?

As the guardians of data, CIOs need to know where all that treasure is hidden

As CIO, you may think that you know where the company has stored all the personal data of its customers. But the privacy experts interviewed for this article say that is very unlikely. "You'd be surprised how many CIOs don't know where all the personal information resides," says Larry Ponemon, founder and chairman of the Ponemon Institute.

So a good place to start in building a sound privacy framework is to find out what personal data you have on customers and where it is stored, says Tess Kolczek, chief privacy officer at E-loan. That requires discussions with the heads of each business unit and possibly midlevel managers to find out exactly what has been squirreled away in hard-to-

find files and databases. Such discussions can unearth the hidden troves of data that could create a privacy breach for the business if accessed by someone not authorized to do so.

Once you find the data, a good practice to follow is to classify it into three categories, Ponemon says: first, highly sensitive, which if accessed or abused could lead to a lawsuit or identity theft (names, addresses, Social Security and credit card numbers, medical information); second, somewhat sensitive, which if released could embarrass individuals or be used to discriminate against them (life events such as anniversaries and birthdays); and third, not-so-sensitive, which cannot harm any individual (usually aggregate

data). The categories will let you know what security and privacy protections you should put in place; the more sensitive the data is, the stricter the measures.

It's also important for CIOs to know how personal information flows throughout the company and outside to third parties with whom the company has signed service contracts. At E-loan, Kolczek says she conducts a data flow audit, a chart that shows where the data enters the system, how it flows to other parts of the company and how each group uses the information. "You don't have to know everyone's job intimately," she says, "but you need to know what each group does with the information and how it transfers it out."

—A.H.



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health-care providers who should not be looking at the records, but he also knew the records had to be easily accessed and immediately available so that doctors and other health-care providers could administer the best care in an emergency.

As a result of that value analysis, Partners' intranet does not have a complicated identity management application that controls access to patient records. When a health-care provider or administrator signs onto the intranet to check a patient's health record, the user must provide her name and relationship to the patient, whether she is the patient's personal physician, attending nurse or lab technician. However, there is no electronic means to verify the provider's identity through a password or some other second-factor identification.

"Technically, we have never been able to figure out how to do that," Glaser says, or at least how to do it in a way that would not hamper providing health care for patients. Glaser says when a patient comes in to the ER because he suffers from, say, cardiac arrest, and other complications are found, such as a malignant tumor, specialists have to be consulted immediately. "You are smothered with people, and you'd better be smothered with people," Glaser says. "We have no idea who has been called in to consult on a patient. We have to protect privacy, but we don't want to unintentionally shut out a provider that can give the proper care now."

When immediate access isn't such a high priority, and personal information is handled by a wider set of people, a more strict value set should be applied. At health researcher I2B2—which stands for Informatics for Integrating Biology and the Bedside, a federally funded research program at Partners Health-Care System—doctors are developing a protocol that requires asking the permission of people before collecting their DNA. In addition, researchers must follow a defined process for accessing patients' health records and then comparing their DNA to the medical histories to find links and causes for genetic diseases, along with possible treatments.

Because such information could be so readily abused (employers could conceivably refuse employment to people with a certain genetic makeup, for instance) the value bar researchers must clear to access such information has to be higher. "The investigators allowed to see this genetic data are also required to sign contracts saying they will not share the data with anyone," says Dr. Shawn Murphy, principal investigator at Massachusetts General Hospital and a founder of I2B2.

Find Out What Your Customers Want

One of the best ways to place a value on personal information is to let the customer decide the value of it. That might seem coun-

E-loan asks customers for permission before it shares personal information with other lenders. "Opt-in is where the value is," says Tess Kolczek, chief privacy officer, E-loan.

terintuitive, but it works for E-loan, an online provider of mortgages and car and personal loans. E-loan has built its reputation on providing strict privacy policies. On its website, E-loan states it has "Lending's strictest privacy policy."

In its online home equity and car loan application forms, E-loan asks customers if they want to opt out of sending their application to an overseas third-party processor. If they opt out, E-loan sends the application to a domestic processor. Unlike many other loan companies, E-loan asks customers for permission before it shares personal information with other lenders—an opt-in policy. E-loan also allows customers access to their personal data to correct errors.

"Opt-in is where the value is," says Tess Kolczek, chief privacy officer for E-loan. "That's where you get a better return."

Ponemon recommends asking customers directly what information of theirs would be a problem if it got into the wrong

hands. There are the obvious answers: Social Security numbers, credit card numbers, driver's license numbers, medication information and addresses. CIOs understand the privacy implications of releasing that kind of information. But CIOs might not view other information as sensitive, even though customers do. This information could include life events such as the birth of a child, anniversaries and birthdays, a job change or change in marital status. Companies may use such information to send out e-mail pitches associated with these events to promote a product or service, irritating customers or violating their own privacy policies.

The answers customers provide will give CIOs the information they need to categorize personal data as highly sensitive, somewhat sensitive or nonsensitive. Appropriate protections and policies can be developed for each category, with stricter security and privacy policies for the most sensitive, and less restrictive for the not-so-sensitive information. "This helps build trust," Ponemon says.

Once values are established for different kinds of personal data, the CIOs we talked to had specific processes that employees were required to follow to make sure the data is not misused or accessed inappropriately. At Boston's I2B2, researchers are required to go through the patient's health-care provider to obtain a patient's consent for information that is not in the medical record, such as DNA. Researchers are not allowed to contact the patient directly. The data is then encrypted before it is sent out to researchers.

Still, once the data is released, there is no safeguard (other than the researchers' professional word and fear of sanctions for violating the Health Insurance Portability and Accountabil-

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ity Act) that the data will not be released to third parties, such as pharmaceutical or insurance companies. "It comes down to only giving these things to people you trust," Dr. Murphy says.

The same precautions the health industry follows can be employed in other industries. Bell Canada's Giordano developed a list of privacy questions marketing managers at the telecom company must check off when new services and products are being developed and readied for marketing. Marketing managers must provide answers to questions such as how the personal data will be collected, with whom they will share the data, how the information will be stored and for how long. Giordano and sometimes a regulatory officer at the company go over the answers, and if any answers to the questions violate privacy policies or laws, Giordano works with the managers to rework the service to make sure the privacy policy is followed.

Unlike privacy officers in U.S. companies, Giordano has a big stick to wield. In 2001, Canada passed a strict privacy law, which sets rules for how companies can collect, use or disclose personal information. For example, data can be stored only for however long it is needed, not indefinitely. The law also gives Canadians the right to access and request correction of personal information. Companies cannot share information among affiliated companies unless they obtain permission first from customers.

Selling Privacy Internally

Still, Giordano says Bell Canada's marketing department was reluctant at first to discuss with company executives who oversee privacy the kind of personal information they had and how they intended to use it, fearing that they might be prohibited from continuing certain marketing practices. So Giordano approached the marketing managers with the idea that he was trying to find ways to protect privacy but not necessarily say no to the use of this data. For example, Bell Canada collects customer consents for its four primary services—wireless, DSL, satellite broadcasting and wireline. In other words, a customer gives the company permission to discuss marketing opportunities with them for any or all of these four services. An onscreen prompt reminds reps what they can and cannot discuss with customers who call in.

"The approach should be: If you give us more information, we can help you with what you are trying to do within the bounds of the law and our privacy policy," Giordano says.

There's much more that companies can do to make privacy a top priority among employees. At Partners HealthCare, the staff sees posters in the halls and elevators that remind them of the HIPAA regulation requiring them not to discuss patient data in public. E-loan's Kolczek recommends that CIOs build a strong relationship with their marketing departments to keep them informed on new

"The perception of how well a company manages privacy has quite an astounding impact on its sales."

—LARRY PONEMON, CHAIRMAN OF THE PONEMON INSTITUTE

privacy laws, citations and how a new marketing practice may violate the privacy policy. "It can be a love-hate relationship," she admits. "But marketing knows if something is done wrong, our relationship [with the customer] is at stake."

Recently, Kolczek had to convince the marketing department that installing third-party adware on E-loan's website that could track a visitor's viewing habits was something she felt violated E-loan's promise to protect customers' privacy. Marketing agreed not to install the software, she says.

The Carrot-and-Stick Approach

At Bell Canada, educating employees about privacy includes managers reviewing the company's privacy policy and code of ethics

with each employee during a performance review and discussing the rules governing use of data, access and disclosure of data, and how that relates to the person's job function. The more access an employee has to customers' personal data, the more time the manager spends on the review. Employees then are asked to sign a document pledging they understand the policies.

And, of course, all of these companies monitor who accesses customers' personal data. At Bell Canada, a rep who accesses a customer account without that customer having called in may be flagged for review. In addition, the company controls access to customer data on a need-to-know basis. Almost all access to personal data is limited to those employees who have direct contact with the customer. Giordano is working with Bell Canada's CIO to develop an application that pops up a message warning employees if they access information they should not. If the employee proceeds, the CIO and appropriate manager will be alerted.

If someone in the company does violate the data use policies, company privacy experts say action must be swift and appropriate to the violation. At companies interviewed for this article, punishments ranged in severity from reprimands and transferring an employee to a less sensitive job to dismissal.

As these examples illustrate, there is much that CIOs can do to take a proactive stance on privacy. The last thing their companies want is to be a sitting duck for the kind of disaster that tarnished CartManager's reputation. After the FTC citation, CartManager was sold to a new owner, Vision Bank Card, which immediately instituted a stronger privacy policy. The policy now explicitly states that no customer information will be sold to third parties. The FTC also ordered CartManager to provide "a clear and conspicuous disclosure" that consumers are entering their credit card and other personal information on CartManager's website, not the original merchant's website.

"We've changed our policy," Hill says. "We now take privacy very seriously." **CIO**

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Cleaning Up After Katrina

The CEO of Oreck Corp. credits quick thinking by employees (including his VP of IT) for a speedy recovery from the hurricane. After all, the systems don't run themselves.

BY STEPHANIE OVERBY



Tom Oreck, president and CEO of Oreck Corp., says the hurricane exposed the weak links in the company's telecommunications network.

JUST BEFORE HURRICANE KATRINA MADE landfall last Aug. 29, Tom Oreck, president and CEO of cleaning products manufacturer and retailer Oreck Corp., took off from New Orleans on a plane bound for Houston. With him were his wife, his three kids (all under age 5), his dog and his company's backup tapes. When he touched down, he FedExed the tapes to the company's backup data center in Boulder, Colo., and began piecing his company back together.

Oreck's headquarters are in New Orleans, and the company also has a 375,000-square-foot manufacturing plant and call center based in Long Beach on the Mississippi Gulf Coast. Though the company was back in operation 10 days after the hurricane (and now, more than six months later, has resumed normal operations), its disaster recovery



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“Everything is—like it or not—linked. And so a breakdown anywhere in IT is a breakdown everywhere.”

—Tom Oreck

plan was severely tested by the storm. The experience taught Tom Oreck some critical lessons about the role of IT in business continuity. First of all, in today's networked environment, when one IT system breaks down, they're all down, for all intents and purposes. Second, the public telecommunications system cannot be counted on. And lastly, although a good business continuity plan is essential, recovery from a disaster depends on what Oreck calls “aggressive improvisation” by employees.

The company owes its existence to improvisation. When Oreck's father David first tried to sell his lightweight, heavy-duty vacuum cleaner in the 1960s, he had

Oreck Corp.

Headquarters: New Orleans

Industry: Manufacturing

2004 revenue: \$190 million (estimated)

Employees: 1,200 (approximately)

IT executive: Mike Evanson, VP of IT

trouble marketing the product through department stores, which were the traditional channel of distribution. So the elder Oreck went straight to the consumer, turning the fledgling Oreck Corp. into a direct marketing company. Back then, Oreck's systems consisted of a few telephones, typewriters and invoices to be filled out in triplicate.

Four decades later, with estimated annual revenue of \$190 million (Oreck doesn't publish its revenue), the mid-market company has 450 retail stores and an expanded product line (it now sells cleaning and air-purification products too). And its IT needs are complex. The direct marketing side of the business lives or dies by its data. Manufacturing depends on supply chain and logistics systems. Customer service needs its call centers.

Tom Oreck and his CFO approve all major IT investments. Nevertheless, Oreck is hard-pressed to name the applications that keep the company running smoothly (aside from that expensive ERP system he recently approved). He is less interested in the systems themselves than in the business results they deliver—or don't. “Our business is about three things. It is about marketing. It is about controlled, aligned distribution. And it is about quality, both in the product and in customer service,” says Oreck.

“IT's role is to support those three things. And as we continue to develop, IT's job is to make sure that the information that's needed is in the form it's needed in, and in the location it needs to be in, for people to be able to accomplish their jobs.”

CIO: What surprised you most about IT's role in the company's recovery after Hurricane Katrina?

Tom Oreck: Communications was a major issue. That was a complete surprise. The first challenge we had was that we could not find people because the cell phone systems came down. The cell phone systems, as far as I'm concerned, have a fundamental design flaw: Every call is routed back through your area code, and if those towers go down, your cell phone does not work. That's absurd in



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"In a crisis, you make decisions quickly. There's no reason that cannot be applied to business as normal. I don't want my VP of IT making rash decisions. But I want him to accumulate all the facts, make a decision and move on."

—Tom Oreck

today's world. We ultimately found a lot of our employees through text messaging.

Cell phones weren't the only problem. Having transferred our backup data software from New Orleans to our hot site in Boulder, and our call center from Long Beach, Miss., to Phoenix and Denver (per Oreck's disaster recovery plan), we were up and running again within five days. But we could not communicate with our Long Beach manufacturing site for 14 days. We expected that there would be problems with connectivity, but it was more of a hardship than we had recognized.

In the end, everything is—like it or not—linked. And so a breakdown anywhere in the system is a breakdown everywhere in the system.

How important was your relationship with suppliers and vendors in getting Oreck back online?

IBM [which provides Oreck's data center services] provided support in areas that we never thought of and weren't even in our contract. For example, more than 250 of our employees lost their homes and all their possessions. IBM provided access to trauma [counselors].

They also helped us set up insurance and claims assistance for employees. It wasn't contractual. But we had a good working relationship with IBM before this happened, and this was an extension of that.

We also called on our relationship with UPS. We're a big customer. With no connectivity in our Long Beach facility, we could no longer distribute our own products. Mike Evanson, our VP of IT, and Candy Mauffray, our director of logistics, worked out a solution: UPS would truck in food and water to our employees in Mississippi and then leave with Oreck products that it could ship from its facility in Atlanta.

We were able to get our distribution systems operating in their facility. Normally that would have taken six to eight weeks, but they worked very hard with us to get them operating within a few days. For a while, when a customer would call Oreck, the call would be routed to our backup call center in Phoenix or Denver; the order would go to our backup computer operations in Denver, and then it would go to UPS in Atlanta, where the shipping label would be printed and the product would be sent out the door.

We always knew these relationships were important. Being located where we are, we have the occasional [hurricane] scare. We implement the disaster recovery plan and come back online. But this time we couldn't come back by ourselves.

In November, you and your executive team rewrote your disaster recovery and business continuity plans. What changed?

We did a lot of things right. But there were a lot of things we didn't know then that we can now take into account.

The one thing that we did not expect was not to have one facility or the other to operate from. We always thought that in a worst-case scenario, we could set up assembly lines in New Orleans. Or if something happened in New Orleans, we could operate out of Long Beach. So now we're talking about the need for additional manufacturing options.

We came up with solutions to prevent communications issues in the future. We're making an information card for every employee that has two telephone numbers on it that will be activated in the event of a disaster. One number is where they can be reached, so they can leave their location, and the other will be the number for a daily 8 a.m. conference call, beginning the day after the disaster.

But I think the most important thing we learned is that, no matter how good your plans are, things happen that you didn't anticipate. What really saves the day is what I would call "aggressive improvisation." That means that people look at a problem and do whatever it takes to solve it. Our people found ways to make things happen.

Has your experience of the past few months changed your view of IT in any way?

That's an interesting question. I'm not sure about IT specifically. But I will tell you that my view of the decision-making process in general has been altered. In a crisis, you find a way to make business decisions more quickly. There's no reason that cannot be applied to business as normal.

As business grows, or any department in a business—such as IT—grows, decision making tends to slow down, and your ability to be nimble diminishes. You start embedding all this bureaucracy in things. Everything gets studied and studied some more, and eventually something gets decided. We have to trust that we've hired good people and empower those people to make decisions without having to jump through bureaucratic hoops, and that includes IT. That doesn't mean I want my VP of IT or anyone else making rash, uninformed decisions. But I want him to accumulate all the facts, make a decision and move on.

Historically, the most frustrating thing for me has been the disconnect between expectation and reality. For a non-technical person like me, you see all of these fancy software packages that look like they will do everything for you but brush your teeth. But in reality there is no

such thing as an easy software installation. Years ago, we had a point-of-sale project that came completely unglued. I had to pull the plug on it.

My experience lately has been better because my VP of IT, Mike Evanson, is grounded in reality. He is an expert, not just on the technical side but on the management side. Everyone wants to point the finger at IT when something goes wrong, but the business users have to take ownership. IT is responsible for finding the right solutions and making sure they function well, but they're not responsible for the business process. Mike is not just a programmer or someone who implements software. He's a businessman who happens to be in IT. He can manage the relationship between IT and its customers.

I'm always cautiously optimistic about what IT can do. But it's important to recognize that IT is an enabler of business process. And it is an enabler of business objectives. It is not, in and of itself, the solution. **CIO**

Senior Editor Stephanie Overby can be reached via e-mail at soverby@cio.com.

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Joseph L. **Badaracco**, Author and Professor of Business Ethics, Harvard Business School

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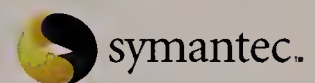
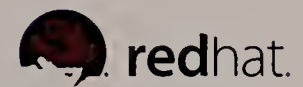
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Symantec Corp.	73
Verizon	23
Xerox Corp.	4

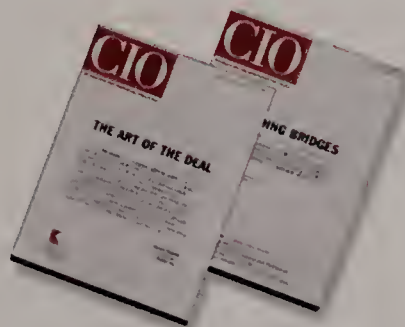
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endlines

BY SCOTT KIRSNER

IT'S NOT A BUG; IT'S A FEATURE

The Good Worms

What if Symantec, McAfee and other companies dedicated to battling computer viruses and worms simply stopped playing defense and got creative? Instead of trying to block the spread of malicious code, why not start producing beneficial bugs that dramatically improve our lives?



VIRUS NAME	ATTACKS	WHAT IT DOES	COMMENTS
Responsive.exe	E-mail	Finds e-mail messages that you never responded to (but should have) and crafts thoughtful and grammatically correct replies	If left untreated, virus will start shopping online for tasteful holiday gifts
I.Have.A.Life Worm	Networked calendar software	Locates meetings scheduled at inappropriate times (before 8 a.m. and after 6:30 p.m.) and reschedules them during normal working hours	Orders doughnuts and coffee for all other meetings
W32/PhotoShop	Digital photo files of all formats	Alters images indiscriminately so that you appear 15 pounds lighter	The W32/PhotoShop/BetterHaircut variant is self-explanatory
Prompt-Payer	E-mail	Not a virus, but a phishing method that entices you to visit your actual bank's actual website, and pay your American Express and Cingular bills before a penalty is assessed	A boon for your credit rating
ShortAndSweet.exe	Presentation files	Randomly erases eight out of every 10 slides before the presentation is delivered	Targets your most verbose colleagues
EmployeeEvaluator	Word processing	Generates uncannily accurate performance reviews for your staff; developed by artificial intelligence experts at MIT	Sample: "If Julian invested half the energy in his job that he dedicates to running the office March Madness pool...."
CutbackReverser	Spreadsheets and budgeting applications	Stealthily increases your quarterly budget by 5 percent	More sophisticated variants also reduce other departments' budgets by a corresponding amount to cover your tracks
The Hangover Virus	E-mail	Blocks e-mails you attempt to send, while drunk, to bosses, former spouses and newspaper op-ed pages	A successor virus, SonOfHangover, deletes from your camera phone all incriminating photos from last night's bender
The MissManners virus	BlackBerrys	Software turns the device off if you attempt to use it in inappropriate places, such as in funeral homes, at school performances or during foreplay	Unfortunately, cannot prevent users from wearing the device on a swiveling belt holster

Sip energy. GULP DATA.



Server Facts:

Sun Fire T1000	IBM x366
2x THE PERFORMANCE ¹	
3x THE CORES	
6	2
18x MORE COMPUTE THREADS PER RACK	
960	52
1/3 THE SIZE	
1U	3U
1/4 THE POWER CONSUMPTION	
300 Watts	1,300 Watts
THE RIGHT ARCHITECTURE FOR YOUR WEB AND APPLICATION WORKLOADS	
ULTRASPARC [®]	Xeon
1/3 THE PRICE	
\$3,495	\$13,147

The Sun Fire™ T1000 Solaris server with CoolThreads™ technology delivers 18 times more compute threads using less than 1/4 the power consumption of Xeon.

Introducing the world's first eco-responsible server. Maximize capacity with dramatic energy efficiency and amazing cost savings. Reduce the number of servers by as much as 3 to 1. And with 2 times the performance for web tier applications, meet the increasing demands on your network—all while looking out for the planet. Visit sun.com.



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Base Pricing - IBM pricing based on configuration with 1 X Dual Core Xeon 3.0GHz processor / 2GB Memory / 4 x 1GbE ports / 1 x PSU / No Disk / SUSE LINUX Enterprise Server 9 1-16 CPUs & Support. IBM.com pricing 11/14/05 from <https://www-1.ibm.com/products/hardware/configurator/na/ui/submitConfigSelection.wss?nc=11319B0BB9146>. Sun Fire T1000 Solaris Server configuration based on 1 x 6 Core UltraSPARC[®] T1 processor at 1.0GHz / 2GB Memory / 4 x 1GbE ports / 1 x PSU / No Disk. IBM x366 product specifications from brochure, 08/26/05; <http://www-132.ibm.com/webapp/wcs/stores/servlet/CategoryDisplay?catalogId=-840&storeId=1&langId=-1&dualCurrId=73&categoryId=2588660>. Power consumption readings come from rating of power supplies. Sun Fire T1000 Solaris server maximum power = 240 Watts. Threads per rack based on priced configurations. 40 x Sun Fire T1000 Solaris Servers delivering 24 threads per server being installed into a rack with 40RU of usable space. 13 x IBM x366 servers can be installed per rack with 40U of usable space. Each server configured with 2 x Xeon cores, with each core delivering 2 threads via hyperthreading. 9.6 GHz represents UltraSPARC[®] T1 processor maximum cumulative GHz.

¹Based on estimated relative webserving performance.

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